IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE

DIVX, LLC, Plaintiff, v. LG ELECTRONICS INC.; LG ELECTRONICS U.S.A., INC., and REALTEK SEMICONDUCTOR CORP., Defendants.	C.A. No.: 20-cv-1202-CFC-JLH JURY TRIAL DEMANDED

FIRST AMENDED COMPLAINT FOR PATENT INFRINGEMENT

DivX, LLC ("DivX" or "Plaintiff"), brings this action for patent infringement under 35 U.S.C. § 271 against Defendants LG Electronics Inc. and LG Electronics U.S.A., Inc. (collectively, "LG" or "the LG Defendants"), and Realtek Semiconductor Corp. ("Realtek") (all collectively "Defendants") and alleges as follows:

1. DivX is a U.S. company founded in 2000. Since its inception, DivX has set the bar for high-quality digital video. DivX is one of the first companies to enable successful delivery of high-quality digital video over the internet. For nearly 20 years, DivX has been developing innovative technology to deliver quality digital entertainment experiences for consumers—making internet video high-quality, secure, easy, and enjoyable for consumers to watch on any device.

2. Continuing to this day, DivX® technology helps people around the world enjoy digital media on their own terms. Consumers expect to play high-quality video from the internet on any device at the touch of a button. However, when DivX's engineers accomplished this feat over a decade ago, they had to overcome significant technical obstacles to do so. Through those

efforts, DivX engineers invented foundational technologies that made high-quality internet video possible long before smart televisions existed.

3. For example, DivX's fundamental advances in video compression technology have made it possible to transmit large video files over the internet. DivX also created technology that allows those video files to be played on a wide variety of consumer electronics devices, and has licensed that technology to consumer electronics manufacturers. DivX further developed encryption technology (*e.g.*, Digital Rights Management) for video files, to protect valuable video content so that content producers would be comfortable making their original works available on the internet. DivX's fundamental advances include innovations in multiphase adaptive bitrate streaming, playback of encrypted bitstreams, cryptographic material transport of bitstreams, and enabling seeking functionality during streaming playback. And DivX launched Stage6—one of the first platforms for streaming high-quality, user-created and professional video over the internet. All of this work by DivX paved the way (and provided a roadmap) for today's proliferation of internet video streaming on consumer devices.

4. As a result of the many DivX innovations relating to internet video and streaming media, consumer electronics companies have licensed DivX's technologies and integrated them into more than one billion, six hundred million devices worldwide. Consumers have downloaded DivX® consumer software more than one billion times, and created billions of files using DivX's proprietary ".divx" file format. DivX's investments in research and development for internet video led to technical innovations that shaped internet video as the world knows it today. DivX patented these inventions and today has a portfolio of over 400 issued patents and patent applications, and continues to invest in research and development to innovate in the area of video technology.

THE PARTIES

5. Plaintiff DivX, LLC is a Delaware corporation, and has a principal place of business at 4350 La Jolla Village Drive, Suite 950, San Diego, California 92122.

6. Defendant LG Electronics Inc. ("LG Electronics") is a South Korean corporation having a principal place of business at LG Twin Tower 128, Yeoui-daero, Yeongdeungpo-gu, Seoul, Korea 07336.

7. Defendant LG Electronics U.S.A., Inc. ("LG USA") is a Delaware corporation having a principal place of business at 1000 Sylvan Avenue, Englewood Cliffs, New Jersey 07632.

8. Defendant Realtek Semiconductor Corp. ("Realtek") is a Taiwanese corporation with a principal place of business at No. 2, Innovation Road II, Hsinchu Science Park, Hsinchu 300, Taiwan.

9. On information and belief, LG USA is a wholly owned subsidiary of LG Electronics.

NATURE OF THE ACTION

10. This Complaint alleges patent infringement. DivX alleges that LG and Realtek have infringed and continue to infringe, directly and/or indirectly, four DivX patents: U.S. Patent No. 8,832,297 ("the '297 Patent"), U.S. Patent No. 10,212,486 ("the '486 Patent"), 10,412,141 ("the '141 Patent"), U.S. Patent No. 10,484,749 ("the '749 Patent") (collectively, the "Asserted Patents"), copies of which are attached hereto as Exhibits 1-4. DivX asserts all four Asserted Patents against the LG Defendants, and asserts the '486 and 749 Patents against Defendant Realtek.

11. By way of assignment, DivX owns all rights, title, and interest to the '297 Patent, the '486 Patent, the '141 Patent, and the '749 Patent.

12. The Asserted Patents are each valid and enforceable.

13. The Asserted Patents cover foundational internet video streaming technologies that are necessary for LG's streaming platform to deliver high-quality video immediately upon the touch of a button, anywhere and on any device. The DivX Patents disclose technologies that enable many benefits, including:

- the inventions claimed in the '297 Patent allow streaming playback devices to dynamically select streams with the ideal maximum bitrate in view of the current streaming conditions, such that startup of video can begin rapidly and watching of video can be stable;
- the inventions claimed in the '486 and '749 Patents allow a more secure digital rights management systems, such that content providers know that the digital content on a playback device is not exposed to piracy during playback;
- the inventions claimed in the '141 patent allow streaming video with multiple tracks to start playing more quickly and allow viewers to use trick play functions right away, improving the user experience.

14. As described in more detail below, the LG Defendants directly infringe the DivX Patents by making, using, offering to sell, selling, and/or importing into the United States internet video streaming technology, software, and services that practice the inventions claimed in the DivX Patents.

15. As described in more detail below, the LG Defendants indirectly infringe the DivX Patents.

16. As described in more detail below, Realtek directly infringes the '486 and '749 Patents ("the Asserted Realtek Patents") making, using, offering to sell, selling, and/or importing into the United States internet video streaming technology, software, and services that practice the inventions claimed in the Asserted Realtek Patents.

17. As described in more detail below, Realtek indirectly infringes the Asserted Realtek Patents.

JURISDICTION AND VENUE

18. This action arises under the Patent Act, 35 U.S.C. § 1 *et seq*.

19. Subject matter jurisdiction is proper in this Court under 28 U.S.C. §§ 1331 and 1338(a).

20. The "Accused LG Products" include, but are not limited to, video processing devices, components thereof, and digital smart televisions containing the same made, used, sold, offered for sale, and/or imported by LG. The "Accused Realtek Products" include all Realtek semiconductor devices, integrated circuits, and products incorporated into video processing devices, and digital smart televisions containing the same made, used, sold, offered for sale, and/or imported by others, including but not limited to LG. The aforementioned groups of products are collectively referred to herein as the "Accused Products."

I. LG

21. Venue in this District is proper under 28 U.S.C. § 1391(c)(1)-(3) and 28 U.S.C. § 1400(b). LG Electronics is not a resident of the United States and may be sued in this District, as suits against foreign entities are proper in any judicial district where they are subject to personal jurisdiction. LG USA is incorporated in this District, and thus resides in this District. Both LG Electronics and LG USA have conducted and continues to conduct business in this District, and both have committed and continue to commit acts of patent infringement in this District.

22. This Court has personal jurisdiction over LG Electronics and LG USA. The Court has personal jurisdiction over LG USA, as it is a resident of Delaware. Both entities have conducted and continue to conduct business in the State of Delaware. Further, both entities, directly or through subsidiaries or intermediaries (including distributors, retailers, and others),

ship, distribute, make, use, offer for sale, sell, import, and/or advertise (including by providing interactive web pages) its products and/or services in the United States and the District of Delaware and/or contributes to and actively induces its customers to ship, distribute, make, use, offer for sale, sell, import, and/or advertise (including the provision of interactive web pages) infringing products and/or services in the United States and the District of Delaware.

23. Both LG Electronics and LG USA, directly and through subsidiaries or intermediaries (including distributors, retailers, and others), have purposefully and voluntarily placed one or more of its infringing products and/or services, as described below, into the stream of commerce with the expectation that those products will be purchased and used by customers and/or consumers in the District of Delaware. These infringing products and/or services have been and continue to be made, used, sold, offered for sale, purchased, and/or imported by customers and/or consumers in the District of Delaware.

24. On information and belief, both LG Electronics and LG USA have also placed video processing devices, components thereof, and digital smart televisions containing the same, into the stream of commerce by shipping Accused Products into Delaware, shipping Accused Products knowing that those products would be shipped into Delaware, and/or shipping Accused Products knowing that these Accused Products would be incorporated into other Accused Products that would be shipped into Delaware.

II. Realtek

25. Venue in this District is proper under 28 U.S.C. § 1391(c)(1)-(3) and 28 U.S.C. § 1400(b) with respect to Realtek. Realtek is not a resident of the United States and may be sued in this District, as suits against foreign entities are proper in any judicial district where they are subject to personal jurisdiction. Realtek has conducted and continues to conduct business in this District, and has committed and continue to commit acts of patent infringement in this District.

26. This Court has personal jurisdiction over Realtek. Realtek has conducted and continues to conduct business in the State of Delaware. Further, Realtek, directly or through subsidiaries or intermediaries (including distributors, retailers, and others), ships, distributes, makes, uses, offers for sale, sells, imports, and/or advertises (including by providing interactive web pages) its products and/or services in the United States and the District of Delaware and/or contributes to and actively induces its customers to ship, distribute, make, use, offer for sale, sell, import, and/or advertise (including the provision of interactive web pages) infringing products and/or services in the United States and the District of Delaware.

27. Realtek, directly and through subsidiaries or intermediaries (including distributors, retailers, and others), has purposefully and voluntarily placed one or more of its infringing products and/or services, as described below, into the stream of commerce with the expectation that those products will be purchased and used by customers and/or consumers in the District of Delaware. These infringing products and/or services have been and continue to be made, used, sold, offered for sale, purchased, and/or imported by customers and/or consumers in the District of Delaware.

28. On information and belief, Realtek has also placed video processing devices, and components thereof and digital smart televisions containing the same made, used, sold, offered for sale, and/or imported by others, including but not limited to LG, into the stream of commerce by shipping Accused Products into Delaware, shipping Accused Products knowing that those products would be shipped into Delaware, and/or shipping Accused Products knowing that these Accused Products would be incorporated into other Accused Products that would be shipped into Delaware.

JOINDER

29. Joinder of Defendants is proper under 35 U.S.C. § 299. Allegations of patent infringement contained herein arise out of the same series of transactions or occurrences relating

to the importing (or having imported) into the United States and/or making (or having made), using (or inducing the use of), selling, or offering for sale within the United States, the same Accused Products, including LG's and Realtek's products, such as the Realtek integrated circuits incorporated into LG's smart televisions.

30. Examples of these products include, but are not limited to LG's and Realtek's video processing devices, and digital smart televisions containing the same, and are imported, sold, offered for sale, and/or used in this District.

FACTUAL BACKGROUND

I. DivX

31. For over 20 years, DivX has invested in developing innovative technology for delivering digital video over the internet. In 2000, delivering digital video over the internet to consumers presented many technical challenges without existing solutions. Jérôme Rota and Jordan Greenhall founded DivX to address these challenges and improve the consumer digital video experience.

32. DivX recognized that consumers wanted accessible, high-quality digital video content. To satisfy this demand, DivX created a new implementation of the MPEG-4 video standard. DivX completed this new implementation in 2001 and released it as the DivX Codec 4.0. A "codec" is a computer program for encoding—that is, compressing—and decoding digital video files. Over the next decade, DivX developed and released numerous new and improved versions of the DivX Codec. DivX bundled the DivX Codec with other features for video encoding, decoding, and playback and packaged it as the "DivX Software."

33. In addition to providing the DivX Codec, the DivX Software functioned like a master translator for digital video files, allowing for variations in codecs, containers, and playback across different file types on different devices. It allowed consumers to compress, decode, and play

back digital video using a single program that could allow users to access and use the variety of technologies available on the market, all in one place.

34. During the same period that DivX continuously evolved and improved its DivX Codec and DivX Software, consumer access to and use of digital video over the internet became more widespread as computing power and network bandwidth increased. These developments led to widespread adoption of the DivX Software, a large base of DivX users, and creation of billions of DivX video files (with the ".divx" file extension).

A. DivX Digital Rights Management

35. Digital Rights Management, or DRM, is the foundation of many DivX innovations. A robust DRM system allows owners of video content (like studio movies) to control access to the video content and provide increased protection against piracy. DRM is therefore fundamental to distribution of video over the internet, because DRM enables secure downloading and playback of videos.

36. In 2000, when DivX began creating an internet video platform, content owners such as Hollywood studios would not release their premium video content on an internet platform because they feared that piracy and losing control of their content would severely diminish the value of their rights.

37. From 2000 to 2005, DivX met with content owners such as Disney, Warner Bros., Sony, Universal, and Paramount Pictures about technical solutions to overcome their concerns and to implement the strict security requirements that the owners demanded. During the same time period, DivX also met with major consumer electronics (CE) manufacturers about overcoming challenges to implementing DRM features in CE devices. DivX recognized at the time that existing technologies would not meet the content protection concerns of studios, and it had to innovate to serve that market need.

38. DivX's engineers worked to build a DRM system that would solve these long-standing technical problems, and as a result of DivX's research and development efforts, DivX DRM became one of the first DRM systems accepted by major Hollywood studios.

B. DivX Open Video System (OVS)

39. DivX was one of the first companies in the world to create a commercially viable internet video streaming platform, called the "Open Video System" ("OVS"). DivX OVS was an internet-based video-on-demand system that built upon the quality and performance of the DivX Software. DivX OVS officially launched on September 6, 2001, at a time where broadband internet access was not yet ubiquitous, and in a business environment where Hollywood studios were not yet ready to embrace digital distribution. After the launch of DivX OVS, DivX engineers continued to invest in technical improvements and innovations for the platform, and their innovations expanded the platform to enable playback on a wide variety of playback devices.

40. DivX's investments in OVS produced many key innovations for delivering video over the internet:

- A flexible, key-based DRM system that tied purchased video content to a viewer rather than a device, preventing unauthorized access when the device was sold or obtained by others while improving the viewer experience.
- A core codec that offered industry-best compression and performance enabling full-screen, DVD-like quality that was vastly superior to the pixelated, postage-stamp size viewing experience associated with internet video at the time.
- A "progressive download" feature that allowed the viewer to begin watching a purchased or rented video after only a few minutes while the file continued to download in the background.

41. DivX OVS was a successful video streaming platform. Throughout the mid-2000s, hundreds of millions of devices spanning virtually every major consumer electronics manufacturer were released supporting DivX OVS playback. Blockbuster, Netflix, Amazon, and others approached DivX about using DivX's technology to power their streaming platforms.

C. DivX Stage6

42. In 2006, DivX launched "Stage6"—one of the first HTTP-based websites for sharing and streaming high-resolution video. Streaming video from an HTTP-based website allows a web server to continuously send data to a viewer over a single HTTP connection that remains open. DivX Stage6 implemented DivX's video compression, codec, and playback technology in an HTTP-based environment and allowed users to upload, share, and view larger video files than other competing platforms from that time, like YouTube.

43. DivX Stage6 was one of the earliest websites that supported sharing and streaming of high-resolution video. Even in 2007, when computing resources and network bandwidth were far more limited than today, DivX Stage6 supported streaming of 720p and 1080p high-definition video. The quality of the high-resolution video playback on Stage6 surprised reviewers, with one commenting "DivX has clearly got something right with web playback of higher-resolution video!"[1] DivX Stage6 enjoyed rapid user traffic growth, and by January 2008, it had over 10,000,000 monthly views.

D. DivX SDKs and CTKs

44. The success of the DivX Software and the DivX Codec created consumer demand to be able to play DivX video files on many CE devices, including DVD and other media players. To meet CE manufacturers' needs to satisfy this demand, DivX created CE software development

[1] *DivX Stage6 (beta)—the high-def rival to YouTube*, Hexus.net, May 1, 2007.

kits ("SDKs") that would allow DVD players and other media players to play DivX files (from CD, DVD, USB, or network) while also incorporating a secure DRM protocol to protect against piracy and offering a variety of other features that created a high-quality video playback experience. DivX also developed Certification Test Kits ("CTKs") for CE manufacturers to certify their licensed devices and communicate to customers that their devices were compatible with DivX files. DivX SDKs and CTKs incorporated DivX's video compression, codec, playback, and DRM technology to provide an enjoyable user experience on a wide range of devices.

45. DivX has licensed its SDKs and CTKs to many CE companies. DivX's innovative technologies have been integrated into more than one and a half billion CE devices via the DivX SDKs and CTKs. To this day, numerous CE companies license DivX's SDKs and CTKs, including leading digital television, smartphone, in-car video device, DVD / Blu-ray disc, integrated circuit (IC), and other CE device manufacturers.

E. DivX Plus Streaming

46. In 2011, DivX released the DivX Plus Streaming SDK, an end-to-end internet video streaming software that rivaled Blu-ray DVDs in quality and feature-set (such as user commands for seeking in the video, fast-forward, and rewind). The DivX innovations incorporated in DivX Plus Streaming include several that provide the foundation for the widespread technological success of video streaming today.

47. DivX Plus Streaming was one of the earliest secure streaming software packages that supported Dynamic Adaptive Streaming over HTTP, abbreviated "DASH." DASH standardizes certain aspects of adaptive bitrate streaming of video over the internet and has been widely adopted as a protocol used by many of today's video streaming services. Fast start and smooth switching among video streams of different resolutions, depending on bandwidth, both

improve the viewer experience during DASH. The innovations incorporated in DivX Plus Streaming improve both of these aspects of the streaming user experience.

48. DivX's engineers' efforts to create DivX Plus Streaming produced many innovations fundamental to today's video streaming services, including:

- Multiphase adaptive bitrate streaming that allowed playback devices to begin playback in an agile state where the device can select the appropriate stream and quickly change streams to facilitate the quick start of a video, while also allowing the video to settle into a stream when conditions are stable, and avoid constant stream switches. While it is sometimes beneficial to switch often when the video is just beginning, constant switching of a stream while a user is watching a video is distracting and should be avoided.
- Trick play that allowed the user to pause, rewind, fast-forward, seek to a new point in the video, and quickly resume playback. Although now common in today's streaming platforms, these features required significant innovations to deliver them in 2011, when the streaming playback experience was far more limited.
- Secure end-to-end DRM that allowed for the secure playback of videos right up to the decoder. DivX's Just-In-Time DRM, implemented in DivX Plus Streaming, is now the standard bearer DRM for video streaming.

THE DIVX ASSERTED PATENTS

49. DivX solely owns all rights, titles, and interests in and to the DivX Patents, each described below.

I. Technical Background of Streaming Video

50. The DivX Patents are directed to improvements to computer systems for video streaming. Video "streaming" refers to the computing process of continuously providing digital video to an end user through a computing device.

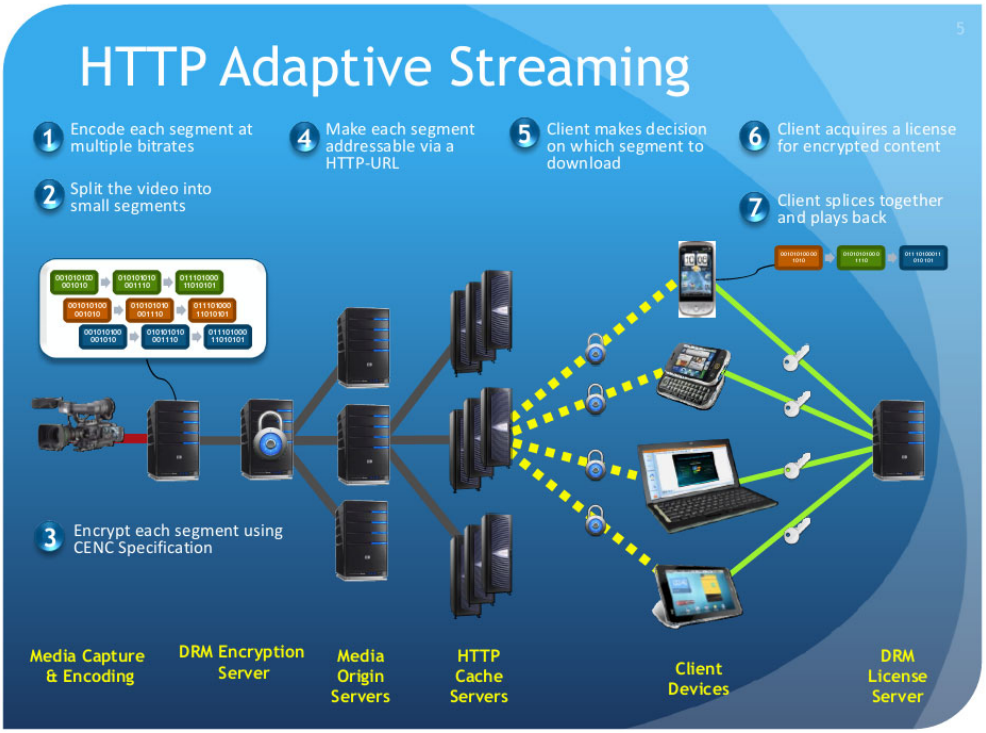
51. Video streaming is accomplished by providing digital video files from server computers that host (store) the video files, over the interconnected computer networks that make up the internet, to client computers (consumer devices, such as desktop computers, laptop computers, smartphones, and smart televisions) that can interpret the video files and convert them to pixels displayed on the screen during playback.

52. The ability to perform video streaming, and the level of performance that can be provided to an end user (such as high-resolution, smooth playback, without stalls or errors), depends on the computing resources of the computing devices—server computers, network computers, and client computers—used in the video streaming system. Those computing resources include the processing power of the computers, the input/output (I/O) and data transmission capabilities of the computers, and the memory (storage) available on the computers.

53. Before digital video, video was stored on analog media such as tape. Transition from analog media to digital video brought new challenges. For example, the amount of data required to represent a video in digital form at its full recorded resolution is massive. The computing resources of servers, networks, and client computers, however, are limited. Streaming digital video, therefore, requires computing techniques to reduce the amount of data that must be processed by server computers, transmitted over networks, and interpreted and converted to displayed video by client devices. These techniques are generally referred to as "encoding" (converting the data to a particular digital format) and "decoding" (translating the digital format to a format that can be rendered and displayed on a display device). A significant challenge in streaming video is ensuring that encoded media is efficiently transmitted to the user, in a secure way, such that playback can begin and be maintained seamlessly.

54. Preventing piracy of digital video is one significant technical challenge for streaming video. Digital rights management (DRM) is an access control method that has been developed to protect digital media. DRM is designed to prevent the end user that has obtained digital media from modifying, copying, converting, or using the digital media in any way other than that permitted by the digital content provider. DRM often includes encryption of digital video data in specific ways using specific encryption structures and encryption and decryption mechanisms. Video streaming involves sending portions of files over a network for decryption and decoding on devices on which other software may be executing. Video streaming technology providers face unique technical challenges in providing adequate security of the video content and control over access rights while reducing the burdens on the encoding and decoding computers relating to encryption and decryption.

55. Adaptive bitrate streaming (ABS) is a specific technique used when streaming multimedia over computer networks to playback devices. ABS differs from other types of streaming because it involves detecting the streaming conditions in real time and adjusting the quality of the streamed media accordingly so the user does not experience stalls in video playback caused by changes in bandwidth or processing capabilities. For ABS, the playback server system encodes a particular video title in separate, multiple streams, at different bitrates, to be streamed consistent with the capabilities of the network and playback device, including bandwidth. If available bandwidth changes, for example, ABS allows the device to switch to a lower-resolution stream of the same video data, which requires less data transmission and processing. This allows the video content to keep playing the video without any stall. The process of stream switching in ABS requires the ability to seek to a particular location in a video file and commence playback without access to all of the preceding portions of the file.



[2]

56. Trick play, or trick mode as it is sometimes called, is a feature that gives viewers visual feedback while they are rewinding or fast-forwarding a stream (i.e., 'scrubbing' through it). For time-based trick mode, users are presented with a progress bar that displays their location in the content and allows them to seek to the desired timestamp using the standard trick play controls. When scene information is not available, a user only has a visual timeline and numeric time information to locate the desired position in the content. Once the new location is selected, the system buffers a minimal amount of stream data and begins playback. A scene-based trick mode is based on the availability of scene information in the form of BIF-files or a common file format for carousels of still frame images that are often used in systems that implement HLS or DASH. If such data are accessible for a given title, the scene-based trick mode can be used during playback.

[2] https://dashif.org/docs/DASH264-v1.5.pdf.

57. In sum, streaming digital video data presents unique technical challenges relating to video compression, delivery, and content protection that affect the computing systems that encode and encrypt digital video, the digital video file types created by those computing systems, and the computing systems that process those file types to decrypt and decode the digital video to provide streaming users with a high-quality experience. DivX's patented inventions provide technical solutions, through computing improvements, to these technical challenges.

II. The '297 Patent

58. United States Patent No. 8,832,297 ("the '297 Patent"), entitled "Systems and Methods for Performing Multiphase Adaptive Bitrate Streaming," issued on September 9, 2014, to inventors Kourosh Soroushian, Auke van der Schaar, Jason Braness, and William David Amidei. The '297 Patent expires on December 29, 2031. The '297 Patent issued from U.S. Patent App. Ser. No. 13/339,992, filed on December 29, 2011, and was previously published as U.S. Patent Pub. No. 2013-0007297 on January 3, 2013. A true and correct copy of the '297 Patent is attached hereto Exhibit 1.

A. Summary of the '297 Patent Invention

59. The asserted claims of the '297 Patent improve the quality of streaming playback using adaptive bitrate streaming ("ABS") computer technology. The '297 Patent inventions achieve this goal by using new and unconventional multiphase adaptive bitrate streaming technology ("MABS") to progress through multiple operational phases in which the playback device responds differently in each operational phase to changes in the streaming conditions, providing the viewer with the highest quality streaming experience.

60. The claims of the '297 Patent are directed to new, improved methods and systems for streaming media, such as digital video content, over the internet as the playback device continuously receives media stored on a server. *See* '297 Patent at 1:22-25. ABS is a streaming

multimedia technique for "detecting the present streaming conditions . . . in real time and adjusting the quality of the streamed media accordingly. . . . [T]he source media is encoded at multiple bit rates and the playback device or client switches between streaming the different encodings depending on available resources." *Id.* at 1:29-36. ABS systems "define a set of conditions that determine whether the playback device continues requesting content for playback, or whether the playback device switches to lower or higher bitrate stream(s). These conditions can be referred to as stream switching conditions." *Id.* at 6:62-67.

61. The inventions of the '297 Patent improve playing back digital video content by "stream[ing] the highest bitrate stream available given the streaming conditions experienced by the playback device without stalls in the playback of media due to underflow." '297 Patent at 1:37-40. "Underflow occurs when the playback device receives streaming media at a lower data rate than the minimum data rate for playing back the stream at the display rate of the playback device." *Id.* at 1:40-43. "Most playback devices accommodate variation in the size of the encoded frames using a buffer." *Id.* at 1:50-52. The inventions of the '297 Patent reduce buffering delay during playback of the digital video content, improving playback of the digital video content and enhancing the user experience. "In the context of video, the buffering delay (which can also be referred to as the seek delay) is the time a playback device waits between starting filling the buffer and commencing playback to prevent underflow (i.e., a certain amount of data is buffered before decoding can start)." *Id.* at 1:50-56.

62. The inventions of the '297 Patent improve adaptive streaming systems by providing MABS technology, and allowing playback devices, rather than remote servers, to control the MABS technology. Using MABS, the playback device responds differently to changes in streaming conditions to further mitigate or avoid playback stalls and sub-optimal media quality.

See id. at 8:18-22. As noted in the '297 Patent, "playback devices are configured to progress through multiple operational phases in which different stream switching conditions are applied by the playback device. These operational phases may be discrete phases or can be a continuum in which the stream switching continuously change. A system where the playback devices progresses through multiple operational phases in which different stream switching conditions are applied by the playback device can be referred to as a multiphase adaptive bitrate streaming system. . . . [T]he stream switching conditions can change over time based upon a variety of factors including (but not limited to) duration of playback of the content, time since last stream switch, duration within an operation phase, buffered content and/or the stability of the streaming conditions experienced during playback." *Id.* at 7:8-25. Using the improved MABS system of the '297 Patent, "stability in streaming conditions or improving streaming conditions can result in a transition to a phase in which the playback device assumes stable operating conditions, buffers more content, and is less responsive to fluctuations in streaming conditions." *Id.* at 8:22-27. Additionally and/or alternatively, according to the inventions of the '297 Patent, "a deterioration in streaming conditions that results in a stream switch to a set of streams requiring less bandwidth results in the playback device transitioning to a phase in which the playback device assumes unstable operating conditions, buffers less content, and responds rapidly to variations in streaming conditions." *Id.* at 8:27-32.

63. The inventions of the '297 Patent improve upon prior playback and ABS systems to enable streaming at the best quality bitrate stream available given the fluctuations in streaming conditions experienced by the playback device and to enable switching streams at the appropriate time, without stalls and with a reduced buffering delay.

B. Technical Problems Addressed by the '297 Patent Inventions

64. Conventional ABS systems applied a set of switching conditions, and did not consider the environment in which the playback device existed. The inventions of the '297 Patent advance and improve on the known ABS system by addressing at least the following problems caused by inferior prior art systems: stalls and underflow, buffering delay, and limited to the same set of stream switching conditions throughout the duration of a stream of media content.

65. The '297 Patent's new playback methods and systems address multiple technical problems. Prior digital video playback ABS systems used the same, fixed set of streaming conditions to determine whether to switch playback from a given multimedia stream to a different resolution stream of the same content. Despite the significant improvement over non-adaptive streaming systems, prior digital video playback ABS systems suffered from significant delays and glitches during multimedia playback. For example, prior digital video playback systems using ABS failed to appropriately adjust to changes in streaming conditions, resulting in stalls or other interruptions in the playback of media due to underflow, such as when the systems "receive[d] streaming media at a lower data rate than the minimum data rate for playing back the stream at the display rate of the playback device." *See* '297 Patent at 1:40-43. Further, prior digital video playback systems using ABS suffered due to large buffering or seek delays. In other words, playing video content using prior digital video playback systems resulted in a large wait time "between starting filling the buffer and commencing playback," because the systems failed to timely adjust to changes in streaming conditions, resulting in an insufficient "amount of data buffered before decoding [and playback] can start." *See id.* at 1:50-56. Prior digital video playback systems also offered a reduced streaming quality experience, as the systems were limited to using the same set of stream switching conditions throughout the duration of a stream of media content, which prevented playback systems when streaming media content from accounting for a variety of

factors, such as the stability of the streaming conditions experienced during playback. *See id.* at 7:20-29.

66. Accordingly, as demand for streaming digital video content increased, a need existed for a new, improved playback implementation able to facilitate (1) an elimination or reduction in stalls or other interruptions during playback, (2) an elimination or reduction in startup delay due to buffering, and (3) providing higher quality playback of media content.

C. Technical Solutions and Benefits Provided by the '297 Patent Inventions

67. The '297 Patent claims specific, technical solutions to the technical challenges presented by prior playback systems, specifically, by enabling the playback device to support MABS, by progressing through multiple operational phases in which different stream switching conditions are applied by the playback device. *See* '297 Patent at 7:8-11. The inventive playback device selects initial streams and stream switching conditions, measures the streaming conditions in real time, detects changes in bandwidth or in processing capabilities, adjusts the quality of streaming, and switches to different operational phases to avoid disruptions. The claims of the '297 Patent are directed to improvements to the functionality of computers that play back video content, and in particular, computers that enable adaptive bitrate streaming of media files on a remote server. The claims of the '297 Patent are directed to improved devices (claim 1 and dependents) and methods (claim 18 and dependents).

68. The claims of the '297 Patent recite a technical solution related to the ability of the playback device to eliminate or reduce interruptions during playback and startup delay due to buffering, and to provide high quality playback of media content. For example, the playback device "progresses through multiple operational phases in which different stream switching conditions are applied . . . . In such a system, the same stream switching conditions or heuristics are not applied throughout the duration of the streaming of a particular piece of content. Instead,

the stream switching conditions can change over time based upon a variety of factors including (but not limited to) duration of playback of the content, time since last stream switch, duration within an operation phase, buffered content and/or the stability of the streaming conditions experienced during playback. While the decision to switch between streams is typically dependent upon a change in streaming conditions, the decision to switch between phases (i.e. the set of stream switching conditions to apply) can be a function of stability in streaming conditions." '297 Patent at 7:8-29. Thus, the MABS system of the '297 Patent allows playback in one operational phase with one set of stream switching conditions. Depending on a variety of factors, such as the stability of the streaming conditions experienced during playback, the playback device can switch to a different operational phase with a different set of stream switching conditions. This implementation was new and not well-known, routine, or conventional at the time of the '297 Patent inventions.

69. Figure 4 of the '297 Patent is a flowchart that illustrates an exemplary process for performing MABS in accordance with the inventions described by the '297 Patent. *See* '297 Patent at 9:41-44.

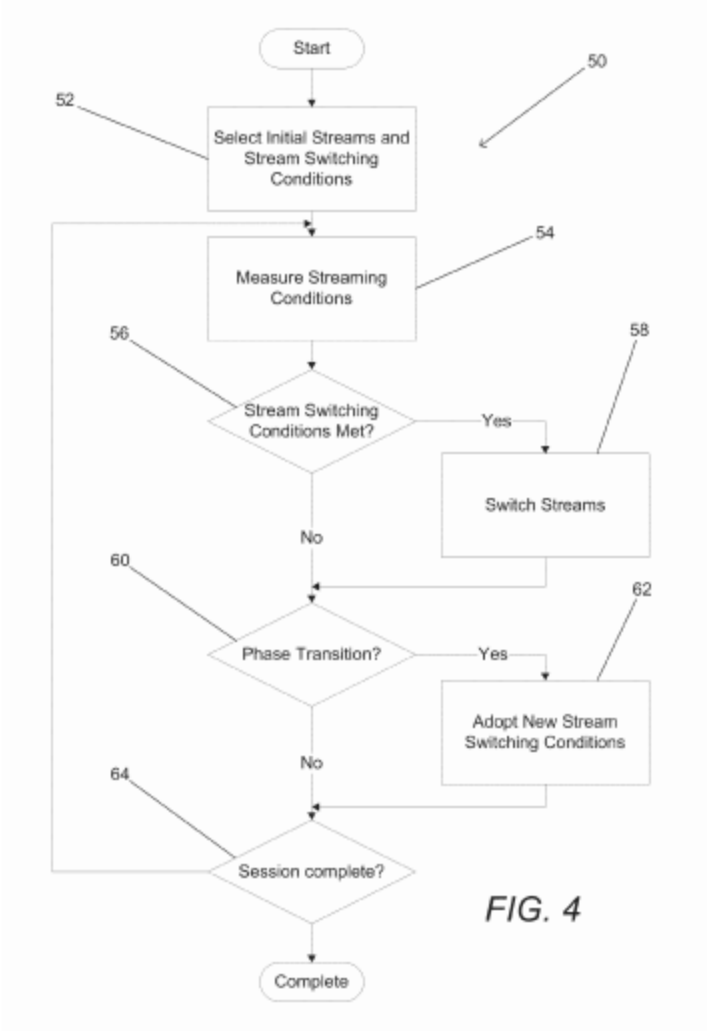


FIG. 4

Id., Fig. 4.

70. The '297 Patent claims technical—not merely conceptual—solutions to recognized, but unsolved shortcomings in ABS technology. For example, referring to Figure 4, the '297 Patent explains that "[t]he process 50 commences by selecting (52) initial streams and stream switching conditions." '297 Patent at 9:44-46. "Once initial streams and stream switching conditions are selected, the process illustrated in FIG. 4 involves measuring (54) streaming conditions as content is received and played back by a playback device, and then determining (56) whether stream switching conditions are met. When the stream switching conditions are met (either to switch to streams having a higher combined maximum bitrate or to switch to streams

that have a lower combined maximum bitrate), the playback device performs (58) the appropriate stream switch(es). The playback device also determines (60) whether the conditions are met for a transition between operational phases. In the event that the conditions are met, the playback device transitions between operational phases, which involves adopting (62) a different set of stream switching conditions." *Id.* at 9:64-10:11.

71. In short, the '297 Patent inventions provide a playback device that enables MABS in which a playback device selects initial streams and stream switching conditions, measures the streaming conditions in real time, detects changes in bandwidth or in processing capabilities, adjusts the quality of streaming based on the measured streaming conditions, and switches to different operational phases to eliminate or reduce interruptions during playback and startup delay due to buffering, and to provide high quality playback of media content.

72. In sum, the inventions claims in the '297 Patent improve performance of video streaming over the Internet. The claims recite new computing techniques that improve the performance of computing systems (servers and playback devices, connected by networks) streaming, using ABS, video content over the internet and playback back that content. These improvements enhance the user experience for internet video streaming. The inventions also reduce the computing burdens on video streaming servers. The inventions achieve these benefits with new computing techniques for streaming video content on a playback device.

- For example, the inventions' new computing techniques enable playback devices to perform MABS by progressing through multiple operational phases in which the playback device responds differently in each operational phase to changes in the streaming conditions. Playback computing devices can employ the inventions' new computing techniques to determine whether to switch operational phases that have different stream switching conditions for switching playback from a given multimedia stream to a different resolution stream of the same content. The

> inventions' new computing techniques reduce or eliminate playback delay, playback start up, and interruptions during playback, which reduces computing burdens on the playback device. The inventions' new computing techniques also provide an improved viewer experience that provides the viewer with higher quality playback.

See, e.g., '297 Patent at 1:22-2:24, 2:28-51, 6:55-7:33, 8:18-32, 8:65-9:37, 9:39-10:15, 10:24-62, 10:64-11:31, 11:34-13:16, FIG. 3, FIG. 4, FIG. 5, FIG. 6, FIG. 7.

D. Prosecution History of the '297 Patent Inventions

73. During prosecution, the patent examiner did not reject the asserted claims of the '297 Patent for lack of subject matter eligibility under 35 U.S.C. § 101. Two claims were rejected under § 101 for reciting "a machine readable medium" instead of a "non-transitory machine readable medium." The claims were corrected and issued as claims 40 and 41. The '297 Patent issued on September 4, 2014, after the U.S. Supreme Court's decision in *Alice Corp. Pty Ltd. v. CLS Bank Int'l*, 573 U.S. 208 (2014).

E. Claims Reciting the Technical Solutions of the '297 Patent Inventions

74. Claim 1 of the '297 Patent recites a playback device for implementing the improved MABS technology that delivers the technical benefits described in the '297 Patent specification:

> 1. A playback device configured to perform multiphase adaptive bitrate streaming by requesting portions of encoded media from a plurality of alternative streams of encoded media that are encoded at different maximum bitrates in response to changes in streaming conditions, the playback device comprising:
> a processor configured, via a client application, to request portions of files from a remote server;
> wherein the client application further configures the processor to:
> commence streaming of the encoded media in a first operational phase utilizing a first set of stream switching conditions by requesting portions of the encoded

media from one of the plurality of alternative streams encoded at a specified maximum bitrate;

measure streaming conditions for receiving the requested portions of the encoded media from a current one of the plurality of alternate streams having a current maximum bitrate;

determine when a first set of stream switching conditions is satisfied in a first operational phase by the measured streaming conditions;

request portions of the encoded media from another one of the plurality of alternative streams encoded at a maximum bitrate that is different than the current maximum bitrate in response to the determination that the first set of stream switching conditions are satisfied;

determine when at least one phase transition criterion of the first operational phase is satisfied by the measured streaming conditions;

transition to a second operational phase utilizing a second set of stream switching conditions in response to the determination that the at least one transition criterion is satisfied;

determine when the second set of stream switching conditions is satisfied in the second operational phase by the measured streaming conditions; and

request portions of the encoded media from another one of the plurality of alternative streams encoded at a maximum bitrate that is different from the current maximum bitrate in response to the determination that the second set of stream switching conditions are satisfied.

'297 Patent at 13:32-14:9.

75. Claim 1 of the '297 Patent therefore recites a playback device progressing through operational phases in which different stream switching conditions are applied by the playback device to prevent underflow and buffering delays. '297 Patent at 13:32-14:9; *see also id.* at 1:22-2:24, 2:28-51, 6:55-7:33, 8:18-32, 8:65-9:37, 9:39-10:15, 10:24-62, 10:64-11:31, 11:34-13:16, FIG. 3, FIG. 4, FIG. 5, FIG. 6, FIG. 7. Claim 1 and its dependents, therefore, recite limitations that enable the technical and performance benefits of the invention described above in Section C.

Claim 1 recites a novel solution for enabling MABS in which a playback device selects initial streams and stream switching conditions, measures the streaming conditions in real time, detects changes in bandwidth or in processing capabilities, adjusts the quality of streaming, and switches to different operational phases to avoid disruptions. *Id.* at 6:59-65, 8:27-32, 9:44-63.

76. Claims 2-17 of the '297 Patent depend from claim 1, and each claim further describes how the new, improved playback implementation facilitates MABS. The ordered combination of elements in each of claims 2-17, in conjunction with the elements of the claims from which they depend, therefore recite unconventional new and improved digital playback systems that were not well-known at the time of the '297 Patent inventions.

77. Claim 18 of the '297 Patent recites a method for practicing the improved MABS implementation that delivers the technical benefits described in the '297 Patent specification:

> 18. A method of performing multiphase adaptive bitrate streaming by requesting portions of encoded media from a plurality of alternative streams of encoded media that are encoded at different maximum bitrates in response to changes in streaming conditions, the method comprising:
> commencing streaming of the encoded media in a first operational phase utilizing a first set of stream switching conditions by requesting portions of the encoded media from one of the plurality of alternative streams encoded at a specified maximum bit rate using a playback device;
> measuring streaming conditions for receiving the requested portions of the encoded media from a current one of the plurality of alternative streams encoded at a current maximum bitrate using the playback device;
> determining when the first set of stream switching conditions is satisfied in a first operational phase by the measured streaming conditions;
> requesting portions of the encoded media from another one of the plurality of alternative streams encoded at a maximum bitrate that is different from the current

> maximum bitrate in response to a determination that the first set of streaming conditions is satisfied using the playback device;
> determining when at least one phase transition criterion of the first operational phase is satisfied by the measured streaming conditions;
> transitioning the playback device to a second operational phase utilizing a second set of stream switching conditions in response to a determination that the at least one phase transition criterion is satisfied;
> determining when the second set of stream switching conditions is satisfied by the measured streaming conditions in the second operational phase;
> requesting portions of the encoded media from another one of the plurality of alternative streams encoded at a maximum bitrate than is different from the current maximum bitrate using the playback device.

'297 Patent at 15:42-16:11.

78. Claim 18 of the '297 Patent therefore recites a method for implementing a playback device progressing through operational phases in which different stream switching conditions are applied by the playback device to prevent underflow and buffering delays. '297 Patent at 15:42-16:11; *see also id.* at 1:22-2:24, 2:28-51, 6:55-7:33, 8:18-32, 8:65-9:37, 9:39-10:15, 10:24-62, 10:64-11:31, 11:34-13:16, FIG. 3, FIG. 4, FIG. 5, FIG. 6, FIG. 7. Claim 18 and its dependents, therefore, recite limitations that enable the technical and performance benefits of the invention described above in Section C. Claim 18 recites a novel solution for enabling MABS in which a playback device selects initial streams and stream switching conditions, measures the streaming conditions in real time, detects changes in bandwidth or in processing capabilities, adjusts the quality of streaming, and switches to different operational phases to avoid disruptions. *Id.* at 6:59-65, 8:27-32, 9:44-63.

79. Claims 18-39 of the '297 Patent depend from claim 18, and each claim further describes how the new, improved playback implementation facilitates MABS. The ordered combination of elements in each of claims 18-39, in conjunction with the elements of the claims

from which they depend, therefore recite unconventional new and improved digital playback systems that were not well-known at the time of the '297 Patent inventions.

III. The '486 Patent

80. United States Patent No. 10,212,486 ("the '486 Patent"), entitled "Elementary Bitstream Cryptographic Material Transport Systems and Methods", issued on 2/19/2019, to inventors Francis Yee-Dug Chan, Kourosh Soroushian, and Andrew Jeffrey Wood. The '486 Patent expires on November 15, 2030. The '486 Patent issued from U.S. Patent App. Ser. No. 15/615,626, filed on June 6, 2017, and was previously published as U.S. Patent Pub. No. 2017-0280203 on September 28, 2017. A true and correct copy of the '486 Patent is attached hereto Exhibit 2.

A. Summary of the '486 Patent Invention

81. The '486 Patent claims are directed to improvements to the structure of encrypted video files in playback devices and methods for decrypting and decoding those files to improve the security of digital video content during playback. '486 Patent, 1:26-59. The '486 Patent invention provides a new type of encryption for digital video files, and improved methods for decrypting and playing back those encrypted files, that improve the security of the digital video data by reducing the likelihood that an unauthorized user can access the data. Specifically, the '486 Patent is directed to a content security architecture that deciphers frame keys and decrypts the video content within a secure video decoder, efficiently enhancing content security. "[B]y allowing the decryption to occur on the decoder the bitstream is protected even if the connection is compromised and an unauthorized component or process intercepts the bitstream." *Id.* at 5:37-40. The inventions recited in the '486 Patent enable Defendants to improve the security of their video streaming systems, allowing them to obtain content from content providers and to trust in the security of its own, home-grown content.

B. Technical Problems Addressed by the '486 Patent Inventions

82. In digital multimedia distribution systems, "the multimedia file is authorized and decrypted in a demultiplexer and then transmitted downstream unencrypted to the decoder via an inter-communication data channel. This however can present a security problem due to the high value of the unencrypted but still encoded bitstream that can be captured during transmission. This bitstream is considered high-value since the encoded data can be easily multiplexed back into a container for unprotected and unauthorized views and/or distribution with no loss in the quality of the data." *Id.* at 6:55-65.

83. The '486 Patent, therefore, addresses a technical problem. Content providers need to make sure that only authorized users can access and play back digital content. *See, e.g., id.* at 1:31-35. This is a particular problem when the content is transmitted over connections that are not secure and can be intercepted. *See, e.g., id.* at 1:53-59 (explaining that "when communication or the transporting of information becomes unsecured or untrustworthy, such gaps need to be accounted for and filled"). Accordingly, a need existed to improve the distribution of digital content to enhance security of content that may be transmitted over an unsecured connection, while enabling efficient access to the content for the correct users. *Id.* at 1:51-53, 1:57-59.

C. Technical Solutions and Benefits Provided by the '486 Patent Inventions

84. The '486 Patent claims a solution to this problem with specific ways to transmit "encrypted multimedia content over an unsecured connection" to improve security and enable efficient distribution and playback of multimedia content. *See, e.g., id.* at 1:28-29. The '486 Patent invention packages decryption information with digital video in a "container file" and allows processing of that file such that decryption can occur on the video decoder. *Id.* at 5:66-6:32, FIG. 1, FIG. 2. The '486 Patent claims are therefore directed to improvements to the functionality of computer systems that perform digital video decryption, decoding, and playback. The '486 Patent

claims are directed to a playback device with a new structure of container file containing encrypted digital video; how a playback device is configured to decrypt, decode, and play back the new file structure (claim 1 and dependents); and the method of decrypting, decoding, and playing back that new file structure (claim 15 and dependents). Prior video container file formats did not contain this specific structure of partially encrypted frames and cryptographic information necessary for decryption and decoding. This new file structure, and the playback devices and methods used to decrypt and play back video structured in this new way, therefore were not well-known, routine, or conventional at the time of the '486 invention.

85. The new structure of a container file containing encrypted digital video of the '486 invention and the playback devices and methods used to decrypt and play back video structured in this new way provide technical benefits that improve the functionality and capabilities of computer systems performing these operations. By providing partially encrypted video frames, coupled with specific cryptographic information describing the encrypted portion of each partially encrypted frame, and requiring deciphering of frame keys using the cryptographic material, the new container file format improves the security of the video data and reduces the processing resources required to decrypt and play back the video. The '486 Patent inventions "do not secure the transmission but rather secure the data being transmitted via the unsecured connection." *See, e.g., id.* at 5:22-40. The inventions accomplish this using enciphered decryption key information in the multimedia data, and not deciphering those keys to decrypt the multimedia until the data is at the decoder and no longer being transmitted. *See, e.g., id.; see also* 6:53-7:5. As a result, "by allowing the decryption to occur on the decoder the bitstream is protected even if the connection is compromised and an unauthorized component or process intercepts the bitstream." *See, e.g., id.* at 5:37-40.

D. Prosecution History of the ’486 Patent Inventions

86. The prior art identified during prosecution of the ’486 Patent did not disclose at least “video data with a plurality of partially encrypted frames, wherein each partially encrypted frame contains encrypted portions and unencrypted portions of data; and a set of cryptographic information describing the encrypted portion of each partially encrypted frame, where cryptographic information for a partially encrypted frame comprises: cryptographic material for the encrypted portion of the partially encrypted frame, and a block reference that identifies the encrypted portion of the partially encrypted frame,” as recited in claims 1 and 10 of the ’486 Patent (later amended and issued as claims 1 and 15), and the claims that depend from those claims. ’486 Patent File History[3], Notice of Allowance, Nov. 21, 2018, at 8-9.

87. During prosecution, the patent examiner did not reject any claims of the ’486 Patent under 35 U.S.C. § 101. The ’486 Patent issued on November 10, 2015, after the U.S. Supreme Court’s decision in *Alice Corp. Pty Ltd. v. CLS Bank Int’l*, 573 U.S. 208 (2014).

E. Claims Reciting the Technical Solutions of the ’486 Patent Inventions

88. The claims of the ’486 Patent recite these computing improvements that provide content security benefits for video transmission and decoding. Claim 1 of the ’486 Patent recites how an improved playback device decrypts and decodes on the decoder the invention’s new container file structure containing encrypted digital video:

> 1. A playback device for playing back encrypted video, the playback device comprising:
> a set of one or more processors; and
> a non-volatile storage containing a playback application for causing the set of one or more processors to perform the steps of:

[3] Cited excerpts of the ’486 Patent file history attached as Exhibit 5.

receiving a container file with video data at a parser;
extracting portions of the container file using the parser,
wherein the container file comprises:
video data with a plurality of partially encrypted frames, wherein each partially encrypted frame contains encrypted portions and unencrypted portions of data; and
a set of cryptographic information describing the encrypted portion of each partially encrypted frame, where cryptographic information for a partially encrypted frame comprises:
cryptographic material for the encrypted portion of the partially encrypted frame, and
a block reference that identifies the encrypted portion of
the partially encrypted frame,
providing each partially encrypted frame, the cryptographic material for each partially encrypted frame, and the block reference for each partially encrypted frame from the parser to a video decoder;
identifying the encrypted portion of each partially encrypted frame using the block reference for each partially encrypted frame;
deciphering a frame key for each partially encrypted frame using the cryptographic material for each partially encrypted frame to produce a frame key for each partially encrypted frame;
decrypting the encrypted portion of each partially encrypted frame based upon the frame key for each partially encrypted frame using the video decoder; and
decoding each decrypted frame for rendering on a display device using the video decoder.

'486 Patent, 10:55-11:26.

89. Claim 1 recites how to improve content security during video decoding by using a novel container file format including encrypted video that is decrypted at the decoder by "deciphering a frame key" for a partially encrypted video frame on the playback device, and "decrypting the encrypted portion of each partially encrypted frame based upon the frame key."

Id. That is, the keys necessary to decrypt the video are protected until they are deciphered on the device. The invention recited in claim 1 solves the problem of enhancing multimedia content security by deciphering frame keys within a secure video decoder in a manner that was not well-understood, routine, or conventional at the time of the '486 Patent.

90. Claims 2-14 of the '486 Patent depend from claim 1, and each of claims 2-14 further describes how the invention's improved playback device is configured to decrypt and play back the new container file structure containing encrypted digital video that improves security of the video content during decoding and playback. The ordered combination of elements in each of claims 2-14, in conjunction with the elements of the claims from which they depend, therefore recite unconventional new and improved computer configurations and video container file structures that were not well-understood at the time of the '486 Patent invention.

91. Claim 15 of the '486 Patent recites how to perform an improved method of playing back video encrypted in the new container file structure of the invention:

> 15. A method for playing back encrypted video, the method comprising:
> receiving a container file with video data at a parser;
> extracting portions of the container file using the parser,
> wherein the container file comprises:
> video data with a plurality of partially encrypted frames, wherein each partially encrypted frame contains encrypted portions and unencrypted portions of data; and
> a set of cryptographic information describing the encrypted portion of each partially encrypted frame,
> where cryptographic information for a partially encrypted frame comprises:
> cryptographic material for the encrypted portion of the partially encrypted frame, and

a block reference that identifies the encrypted portion of the partially encrypted frame,

providing each partially encrypted frame, the cryptographic material for each partially encrypted frame, and the block reference for each partially encrypted frame from the parser to a video decoder;

identifying the encrypted portion of each partially encrypted frame using the block reference for each partially encrypted frame;

deciphering a frame key for each partially encrypted frame using the cryptographic material for each partially encrypted frame to produce a frame key for each partially encrypted frame;

decrypting the encrypted portion of each partially encrypted frame based upon the frame key for each partially encrypted frame using the video decoder; and

decoding each decrypted frame for rendering on a display device using the video decoder.

'486 Patent, 12:9-42.

92. Claim 15 recites how to improve content security during video decoding by using the new container file structure, reciting "deciphering a frame key" for a partially encrypted video frame on the playback device, and "decrypting the encrypted portion of each partially encrypted frame based upon the frame key." *Id.* That is, the keys necessary to decrypt the video are protected until they are deciphered on the device. The invention recited in claim 15 solves the problem of enhancing multimedia content security by deciphering frame keys within a secure video decoder in a manner that was not well-understood, routine, or conventional at the time of the '486 Patent invention.

93. Claims 16-25 of the '486 Patent depend from claim 15, and each of claims 16-25 further describes how to perform the invention's improved method for playing back the new container file structure containing encrypted digital video that improves security of the video content during decoding and playback on a video decoder. The ordered combination of elements

in each of claims 16-25, in conjunction with the elements of the claims from which they depend, therefore recite unconventional new and improved computer processes and video container file structures that were not well-understood at the time of the '486 Patent invention.

IV. The '141 Patent

94. United States Patent No. 10,412,141 ("the '141 Patent"), entitled "Systems and Methods for Seeking Within Multimedia Content During Streaming Playback," issued on September 10, 2019, to inventor Roland Osborne. The '141 Patent expires on January 7, 2028. The '141 Patent issued from U.S. Patent App. Ser. No. 16/136,149, filed on September 19, 2018, and was previously published as U.S. Patent Pub. No. 2019-0020704 on January 17, 2019. A true and correct copy of the '141 Patent is attached hereto Exhibit 3.

A. Summary of the '141 Patent Invention

95. The inventions claimed in the '141 Patent allow streaming video of multiple title tracks, audio tracks, and subtitle tracks to start playing more quickly and allow viewers to use trick play functions right away. The '141 patent inventions achieve this goal by using metadata describing a multimedia file to determine and request smaller portions of the multimedia file so the user has access to the requested portions quickly, and commencing playback or trick play once the multimedia data in the buffer reaches a threshold sufficient to avoid playback stalls.

96. The claims of the '141 Patent are directed to new, improved methods and systems for playing back digital video content over the internet as the playback device downloads the content. The '141 Patent inventions enable user-driven or receiver-driven playback of digital video content selected from multiple tracks of media data. A user-driven or receiver-driven approach to playback occurs when the device, based on user instruction, determines the data that is requested and downloaded and parses the files to determine when to request and download additional data. *See* '141 Patent, 1:40-55, 2:1-19.

97. The inventions improve "playing multimedia files over a network and more specifically [] the progressive playback of multimedia files as they are downloaded over a network." '141 Patent, 1:28-31. The '141 Patent inventions improve trick play functions for progressive playback of partially downloaded media files, that can contain one or more video tracks, one or more audio tracks and/or one or more subtitle tracks. *Id.* at 2:23-39. "Progressive playback" refers to playing remote video content as the player downloads the content, e.g., beginning to play video content before the player has received or downloaded the complete video file. *Id.* at 1:32-35. "With this feature a user can select a remote movie and commence watching it before it is fully downloaded. Even with a fast Internet connection, waiting for a movie to fully download can range from minutes to hours depending on the size of the media file. With progressive playback a user only has to wait a couple of seconds before playback can begin." *Id.* at 1:23-29. "Trick play" functions include performing playback functions "such as rewinding, fast forwarding and skipping between scenes that require non-sequential access of media content." *Id.* at 2:10-13. The invention enables trick play functions to occur without requiring the sequential downloading and processing of either an entire media file or parts of media files required to execute a trick play instruction, while minimizing system latency. *Id.* at 5:39-45.

98. The '141 Patent inventions improve upon existing playback systems to enable streaming for longer video content (such as episode- or feature-length content) and more complex media libraries, and to enable playback systems to provide seeking functionality during progressive playback of multi-track media files without stalls or startup delay.

B. Technical Problems Addressed by the '141 Patent Inventions

99. The '141 Patent inventions address these problems caused by inferior prior art systems: startup delay, streaming options limited to single track files, audio files, and/or files without subtitles, and lack of or limited trick play functionality. The '141 Patent's new playback

methods and systems address multiple technical problems. Existing digital video playback systems facilitated progressive playback for only short video clips because the systems downloaded video files *linearly,* from beginning to end. *Id.* at 1:44-45. Playback would begin only after the player had "buffered enough data to provide a likelihood that the media [would] play without interruption." *Id.* at 1:45-47. Because playback would begin only after the player had downloaded sufficient data, longer content would suffer from startup delay: "The buffering requirement can either be a fixed amount suitable for a large percentage of content, or a dynamic amount, where the player infers how much data is required to play the entire content without suffering buffer under-run." *Id.* at 1:47-51. Thus, existing systems did not support random seeking, trick play (for example, pausing, rewinding, fast forwarding, skipping), or playing back longer content (i.e., feature-length movies), and was not suitable for use with internet servers that "store files that can contain multiple titles, titles that include multiple audio tracks, and/or titles that include one or more subtitle tracks." *Id.* at 1:50-55, 2:34-39; *see also id.* at 2:3-10 ("When a long clip is started, it is impossible to seek or fast-forward to a point in the file that has not already been downloaded."). Multi-track media, in particular, was not suitable for the existing smooth trick play functionality as the playback device must download the data for the other tracks, even if only certain tracks have been chosen for playback. *See id.* at 10:46-11:12. Such systems were likely to suffer from buffer under-run when receiving trick play instructions, resulting in playback stalls and startup delays caused by access delays in data transmission and computing burdens placed on the network and device.

100. Some existing streaming systems were "server-driven," as opposed to receiver-driven (e.g., based on instructions from the player). In server-driven systems, "the server parse[d] the data file and determine[d] which data to send" for playback. *Id.* at 1:66-67. Server-driven

systems required custom computing systems, which increased expense: "[s]tandard HTTP web servers . . . do not typically provide this functionality, and custom web servers providing this functionality often scale poorly when called upon to deliver content simultaneously to a large number of players." *Id.* These systems required expensive, impractical, inefficient custom server designs unable to simultaneously supply digital video content to a large number of playback devices. *Id.*

101. Accordingly, as demand for streaming digital video content increased, a need existed for a new, improved playback implementation able to facilitate (1) efficient non-linear partial-download playback with trick play functionality, (2) *receiver*-driven partial-download playback compatible with HTTP, and (3) delivery of video streaming to a large number of devices.

C. Technical Solutions and Benefits Provided by the '141 Patent Inventions

102. The '141 Patent claims specific, technical solutions to the technical challenges presented by existing playback systems, specifically, by enabling the playback device to support playback of multiple audio and subtitle tracks without downloading them all. *See, e.g., id.* at 2:23-39. The system selects video, audio, and/or subtitle tracks among other tracks in the file and requests specific portions of the selected tracks for download, buffering, and playback based on instructions at the playback device. The '141 Patent claims are directed to improvements to the functionality of computers that request, receive, download, buffer, and play back digital video, audio, and subtitle content stored in container files on a remote server. The '141 Patent claims are directed to improved devices (claim 1 and dependents, and claim 12 and dependents) and methods (claim 20 and dependents).

103. Some claims recite a technical solution related to the player's ability to deliver requests to the server for specific portions of a video file. For example, "[i]n several embodiments, the ability to provide full featured progressive playback is due in part to the tight coupling of the

playback engine for the media sequence (i.e., the system that decodes and plays back the encoded media) with a transport protocol that provides random access to the remote file. Interfacing of the playback engine with the transport protocol via a file parser can reduce latency and enable the client and media server to operate in parallel improving download efficiency and interactivity." *Id.* at 2:40-48. Further, the multi-track media "files are formatted to include an index to the data within the file and a transport protocol that allows for downloading specific byte ranges within a file." *Id.* at 2:48-52; *see also id.* at 6:20-44 ("When the media file includes an index, a device configured with a client application in accordance with an embodiment of the invention can use the index to determine the location of various portions of the media. Therefore, the index can be used to provide a user with 'trick play' functions. . . . [T]he client application requests portions of the media file using a transport protocol that allows for downloading of specific byte ranges within the media file.").

104. The '141 Patent inventions provide an improved playback implementation that enables a client application at the player to commence playing video content and to request non-sequential portions of the video file without receiving the complete video file. *Id.* at 5:28-49. The inventions create a client computing application capable of implementing progressive playback and supporting trick play functionality for files containing multiple titles and for titles with multiple media tracks. *Id.* at 5:28-49, 2:23-39. This implementation was new and not well-known, routine, or conventional at the time of the '141 Patent inventions.

105. The '141 Patent claims technical—not merely conceptual—solutions to recognized, but unsolved progressive playback shortcomings. The '141 Patent inventions specify a client application with multiple "abstraction layers" to facilitate progressive playback with trick play functionality. *Id.* at 7:13-34. One exemplary embodiment of the player claimed by the '141

Patent includes a download manager "that is responsible for coordinating the downloading of specific byte ranges of a file from a remote server"; a playback engine "that coordinates the playback of a media file in response to user interactions"; and a file parser that "interfaces between the playback engine and the download manager" and "maps high level data requests from the playback engine to specific byte ranges that can then be requested using the download manager." *Id.*

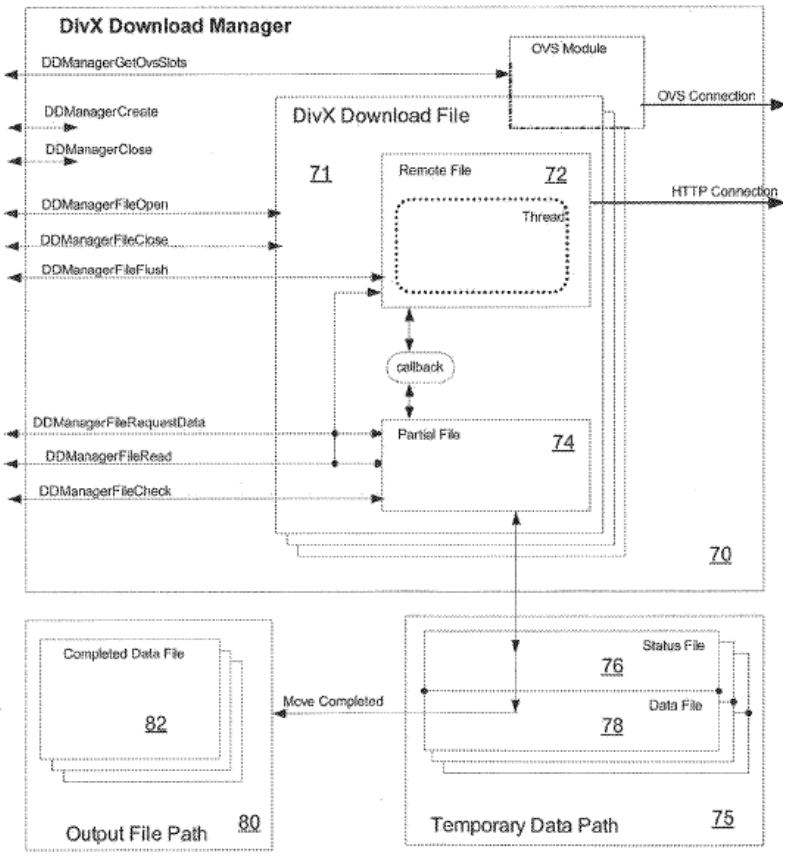


FIG. 4

'141 Patent, Fig. 4.

106. The '141 Patent inventions improve on existing playback systems by enabling trick play functionality for content that has yet to be downloaded. "Instead of sequentially downloading a media file and waiting until the required information has been downloaded to perform a 'trick

play' function, client applications in accordance with embodiments of the invention can determine portions of a media file that are required to support a specific 'trick play' function and request those portions of the file from the remote server. When a 'trick play' function involves skipping to portions of the media that have not been downloaded, such as fast forwarding and skipping between chapters, latency can be significantly reduced compared to sequential download." *Id.*

107. The claims of the '141 Patent enable trick play function for downloaded content by requiring the playback device to request and buffer sufficient data from the new playback location. The '141 Patent claims recite an index, from which the playback engine can "refer to the index to determine the media information required to play the media file in the manner requested by the user," including by using a file parser and download manager to extract the necessary information from the index. *Id.* at 10:46-61. The playback engine can then select portions of the media file "based upon instructions, including 'trick play' instructions, received from the user and provide[] instructions to the file parser to download [] the selected" portions. *Id.* at 10:46-67. "When the playback engine receives the chunks from the file parser, the chunks are queued and provided to an appropriate decoder to enable the playing [] of the media. Playback of the movie can begin once enough of the movie has been downloaded. The buffered length can be determined by the length of the playback list shared with the" download component. *Id.* at 11:3-12.

108. In short, the '141 Patent inventions provide a playback system able to navigate a remote multi-track digital video file, select specific video, audio, and/or subtitle tracks for download, and request specific portions of the selected tracks to download and play back, enabling random access to other portions of the file for download, buffering, decryption, and playback, based on instructions from the system's user.

109. In sum, the inventions claimed in the '141 Patent improve performance and user interactivity of video streaming over the internet. The claims recite new computing techniques that improve the performance of computing systems (servers and playback devices, connected by networks) streaming video content over the internet and playing back that content. These improvements enhance the user experience for internet video streaming. The inventions also reduce the computing burdens on video streaming servers and economic costs associated with those burdens. The inventions achieve these benefits with new computing techniques for processing computer files containing multimedia data on a playback device.

- For example, the inventions' new computing techniques enable random seeking within an episode- or feature-length video upon beginning streaming. The new computing techniques enable random seeking in higher-resolution videos streamed using variable bitrates. The file structure processed using the new computing techniques include video data, audio data, and subtitle data. The file structure also includes an index to the video and audio data that references byte ranges corresponding to locations within the video data and audio data in the file. Playback computing devices can employ the inventions' new computing techniques to use the index data to implement seeking and stream selection functionality within an HTTP streaming environment in a way that allows the playback device to play back the multimedia content without having to download all streams in their entirety.
- The inventions' new index referencing byte ranges enables video streaming services to reduce computing burdens on their media streaming servers and reduce associated costs. The cost reductions enabled by the inventions also allow video streaming services to scale their services to many different users and playback devices while mitigating computing burdens.

- The inventions' new computing techniques also facilitate playback of episode- and feature-length video without stalls. For example, the new computing techniques include measuring video data stored in a buffer on the computing device to determine when to begin playing back video upon startup or after a seek instruction from the user. The new computing techniques also include interpreting the new index to convert user seek commands to requests to the streaming server for specific video portions. The inventions' new computing techniques enable video streaming services to offer an improved user experience that mimics the interactivity and quality of a DVD.

See, e.g., '141 Patent at 1:32-2:19, 2:23-67, 4:11-19, 4:63-5:7, 5:20-23, 5:28-49, 7:4-34, 9:41-59, 9:67-10:4, 10:27-40, 10:46-65, 11:3-12, 11:21-34, FIG. 2, FIG. 3, FIG. 4, FIG. 5, FIG. 9.

D. Prosecution History of the '141 Patent Inventions

110. The claims of the '141 Patent issued at least because they recite a receiver- or player-driven playback implementation compatible with HTTP to facilitate trick play functionality. The prior art cited in prosecution did not teach "the recited features/elements" of the invention "*as a whole.*" '141 Patent File History[4], Notice of Allowance (April 19, 2019) (emphasis original). Specifically, "none of the applied prior art references . . . or additional candidate prior art references, expressly / sufficiently" disclosed a client or playback device that performed the steps of "obtaining index information indicating the locations of audio and video data within the selected audio and video tracks[,] determining bye ranges to request from the selected audio and video tracks using the index information[,] requesting byte ranges from the selected video track and the selected audio track from the remote server system[,] buffering received byes of information comprising audio and video data[,] checking that sufficient data is buffered to

[4] Cited excerpts of the '141 Patent file history attached as Exhibit 6.

commence playback and playing back the buffered audio and video data[,] responding to a received seek instruction by[,] pausing playback[,] determining byte ranges to request from the selected audio and video tracks based upon a new playback location using the index information[,] and requesting byte ranges required to play the media sequence from the new playback location from the remote server." '141 Patent File History[5], Notice of Allowance (April 19, 2019), at 2-3.

111. During prosecution, the patent examiner did not reject any claims of the '141 patent for lack of subject matter eligibility under 35 U.S.C. § 101. The '141 Patent issued on September 10, 2019, after the U.S. Supreme Court's decision in *Alice Corp. Pty Ltd. v. CLS Bank Int'l*, 573 U.S. 208 (2014).

E. Claims Reciting the Technical Solutions of the '141 Patent Inventions

112. Claim 1 of the '141 Patent recites a playback device for implementing the improved non-sequential playback and trick play implementation for multi-track media files that delivers the technical benefits described in the '141 Patent specification:

> 1. A playback device, comprising:
> a processor; and
> a non-volatile storage containing an application for causing the processor to perform the steps of:
> establishing at least one connection for communicating with a remote server system;
> obtaining information from a remote server system describing at least one video track, multiple audio tracks, and multiple subtitle tracks;
> selecting a video track from the at least one video track;
> requesting a header describing the selected video track;
> selecting an audio track from the multiple audio tracks;

[5] Cited excerpts of the '141 Patent file history attached as Exhibit 6.

obtaining index information indicating the locations of audio and video data within the selected audio and video tracks;

determining byte ranges to request from the selected audio and video tracks using the index information;

requesting byte ranges from the selected video track and the selected audio track from the remote server system;

buffering received bytes of information comprising audio and video data;

checking that sufficient data is buffered to commence playback and playing back the buffered audio and video data;

responding to a received seek instruction by:

pausing playback;

determining byte ranges to request from the selected audio and video tracks based upon a new playback location using the index information;

requesting byte ranges required to play the selected audio and video tracks from the new playback location from the remote server;

buffering received bytes of information comprising audio and video data pending resumption of playback; and

checking that sufficient data is buffered to commence playback and playing back the buffered audio and video data.

'141 patent, at 11:53-12:24.

113. Claim 1 of the '141 Patent therefore recites a playback device implementing a receiver-based playback device supporting playback of multiple audio and subtitle tracks without downloading them all. *Id.; see also id.* at 1:28-2:19, 2:23-67, 4:11-19, 4:63-5:7, 5:20-23, 5:28-49, 7:4-34, 9:41-59, 9:67-10:4, 10:27-40, 10:46-11:12, 11:21-34, FIG. 2, FIG. 3, FIG. 4, FIG. 5, FIG. 9. Claim 1 and its dependents, therefore, recite limitations that enable the technical and performance benefits of the invention described above in Section C. Claim 1 recites a novel solution for enabling non-sequential playback with trick play functionality for multi-track media files using an index to identify the locations of audio and video data within selected media tracks

and to determine the byte ranges to request from said tracks from a remote server system, buffering the received bytes of information, and checking that sufficient data is buffered to commence playback of the specifically requested data.

114. Claims 2-11 of the '141 Patent depend from claim 1, and each claim further describes how the new, improved playback implementation facilitates efficient, non-sequential partial-download playback with trick play functionality for multi-track media files. The ordered combination of elements in each of claims 2-11, in conjunction with the elements of the claims from which they depend, therefore recite unconventional new and improved digital playback systems that were not well-known at the time of the '141 Patent inventions.

115. Claim 12 of the '141 patent recites a playback device for implementing the improved playback and trick play implementation for multi-track media files that delivers the technical benefits described in the '141 patent specification:

> 12. A playback device, comprising:
> a processor; and
> a non-volatile storage containing an application for causing the processor to perform the steps of:
> establishing at least one connection for communicating with a remote server system;
> obtaining information from a remote server system describing at least one video track, and at least one audio track;
> selecting a video track from the at least one video track;
> requesting a header describing the selected video track, where the requested header comprises a DRM header;
> decrypting the DRM header;
> selecting an audio track from the at least one audio track;
> obtaining index information indicating the locations of audio and video data within the selected audio and video tracks;

determining byte ranges to request from the selected audio and video tracks using the index information;
creating a buffer;
requesting byte ranges from the video track and the audio track from the remote server system;
buffering received bytes of information comprising audio and video data;
checking that sufficient data is buffered to commence playback;
decrypting encrypted frames of video using information from the decrypted DRM header;
playing back the buffered audio and the decrypted video data;
responding to a received seek instruction by:
pausing playback;
discarding buffered audio and video data;
determining byte ranges to request from the selected audio and video tracks based upon a new playback location using the index information;
requesting byte ranges required to play the selected audio and video tracks from the new playback location from the remote server;
buffering received bytes of information comprising audio
and video data pending resumption of playback;
checking that sufficient data is buffered to commence playback;
decrypting encrypted frames of video using information from the decrypted DRM header; and
playing back the buffered audio and decrypted video data.

Id. at 13:5-55.

116. Claim 12 of the '141 Patent therefore recites a playback device implementing a receiver-based playback device supporting playback of multiple audio and subtitle tracks without downloading them all. *Id.; see also id.* at 1:28-2:19, 2:23-67, 4:11-19, 4:63-5:7, 5:20-23, 5:28-49, 7:4-34, 9:41-59, 9:67-10:4, 10:27-40, 10:46-11:12, 11:21-34, FIG. 2, FIG. 3, FIG. 4, FIG. 5, FIG. 9. Claim 12 and its dependents, therefore, recite limitations that enable the technical and

performance benefits of the invention described above in Section C. Claim 12 recites a novel solution for enabling non-sequential progressing playback with trick play functionality for multi-track media files using an index to identify the locations of audio and video data within selected media tracks and to determine the byte ranges to request from said tracks from a remote server system, buffering the received bytes of information, and checking that sufficient data is buffered to commence playback of the specifically requested data, and decrypting the requested data using a decrypted DRM header for playback. *Id.* at 13:5-55.

117. Claims 13-19 of the ’141 Patent depend from claim 12, and each claim further describes how the new, improved playback implementation facilitates efficient, non-sequential partial-download decryption and playback, with trick play functionality, for multi-track media files. The ordered combination of elements in each of claims 13-19, in conjunction with the elements of the claims from which they depend, therefore recite unconventional new and improved digital playback systems that were not well-known at the time of the ’141 Patent inventions.

118. Claim 20 of the ’141 Patent recites a method for practicing the improved non-sequential playback implementation with trick play functionality for multi-track media files that delivers the technical benefits described in the ’141 Patent specification:

> 20. A method of playing back content on a playback device, comprising:
> establishing at least one connection for communicating with a remote server system using a playback device;
> obtaining information from a remote server system using the playback device, where the obtained information describes at least one video track, multiple audio tracks, and multiple subtitle tracks;
> selecting a video track from the at least one video track;
> requesting a header describing the at least one video track using the playback device;
> selecting an audio track from the multiple audio tracks using the playback device;

obtaining index information indicating the locations of audio and video data within the selected audio and video tracks;
determining byte ranges to request from the selected audio and video tracks using the index information;
requesting byte ranges from the selected video track and the selected audio track from the remote server system using the playback device;
buffering received bytes of information comprising audio and video data on the playback device;
checking that sufficient data is buffered to commence playback and playing back the buffered audio and video data using the playback device;
responding to receipt of a seek instruction at the playback device by:
pausing playback on the playback device;
determining byte ranges to request from the selected audio and video tracks based upon a new playback location using the index information;
requesting byte ranges required to play the selected audio and video tracks from the new playback location from the remote server using the playback device;
buffering received bytes of information comprising audio and video data pending resumption of playback using the playback device; and
checking that sufficient data is buffered to commence playback and playing back the buffered audio and video data using the playback device.

Id. at 14:31-15:6.

119. Claim 20 of the ’141 Patent therefore recites a method for implementing a receiver-based playback device with trick play functionality. *Id.*; *see also id.* at 1:28-2:19, 2:23-67, 4:11-19, 4:63-5:7, 5:20-23, 5:28-49, 7:4-34, 9:41-59, 9:67-10:4, 10:27-40, 10:46-11:12, 11:21-34, FIG. 2, FIG. 3, FIG. 4, FIG. 5, FIG. 9. Claim 20 and its dependents, therefore, recite limitations that enable the technical and performance benefits of the invention described above in Section C. Claim 20 recites a novel solution for enabling non-sequential playback with trick play functionality for multi-track media files using an index to identify the locations of audio and video data within selected media tracks and to determine the byte ranges to request from said tracks from a remote

server system, buffering the received bytes of information, and checking that sufficient data is buffered to commence playback of the specifically requested data.

120. Claims 21-30 of the '141 Patent depend from claim 20, and each claim further describes how the new, improved playback implementation facilitates efficient, non-sequential partial-download decryption and playback, with trick play functionality, for multi-track media files. The ordered combination of elements in each of claims 21-30, in conjunction with the elements of the claims from which they depend, therefore recite unconventional new and improved digital playback systems that were not well-known at the time of the '141 Patent inventions.

V. The '749 Patent

121. United States Patent No. 10,484,749 ("the '749 Patent"), entitled "Systems and Methods for Secure Playback of Encrypted Elementary Bitstreams," issued on November 19, 2019, to inventors Francis Yee-Dug Chan, Kourosh Soroushian, and Andrew Jeffrey Wood. The '749 Patent expires on November 15, 2030. The '749 Patent issued from U.S. Patent App. Ser. No. 16/136,170, filed on September 19, 2018, and was previously published as U.S. Patent Pub. No. 2019-0020928 on January 17, 2019. A true and correct copy of the '749 Patent is attached hereto Exhibit 4. The '749 Patent is a descendant of the '486 Patent, and the patents share a common specification.

A. Summary of the '749 Patent Invention

122. The '749 Patent claims are directed to improvements to the structure of encrypted video files in playback devices and methods for decrypting and decoding those files to improve the security of digital video content during playback. '486 Patent,[6] 1:26-59. The '749 Patent

[6] The '749 Patent and '486 Patent share a specification. Thus for consistency, the citations in this section are made to the '486 Patent, as above.

invention provides a new type of encryption for digital video files, and improved methods for decrypting and playing back those encrypted files, that improve the security of the digital video data by reducing the likelihood that an unauthorized user can access the data. Specifically, the '749 Patent is directed to a content security architecture that deciphers frame keys and decrypts the video content within a secure video decoder, also storing a key table, efficiently enhancing content security. "[B]y allowing the decryption to occur on the decoder the bitstream is protected even if the connection is compromised and an unauthorized component or process intercepts the bitstream." *Id.* at 5:37-40. The inventions recited in the '749 Patent enable Defendants to improve the security of their video streaming systems, allowing them to obtain content from content providers and to trust in the security of its own, home-grown content.

B. Technical Problems Addressed by the '749 Patent Inventions

123. In digital multimedia distribution systems, "the multimedia file is authorized and decrypted in a demultiplexer and then transmitted downstream unencrypted to the decoder via an inter-communication data channel. This however can present a security problem due to the high value of the unencrypted but still encoded bitstream that can be captured during transmission. This bitstream is considered high-value since the encoded data can be easily multiplexed back into a container for unprotected and unauthorized views and/or distribution with no loss in the quality of the data." *Id.* at 6:55-65.

124. The '749 Patent, therefore, addresses a technical problem. Content providers need to make sure that only authorized users can access and play back digital content. *See, e.g., id.* at 1:31-35. This is a particular problem when the content is transmitted over connections that are not secure and can be intercepted. *See, e.g., id.* at 1:53-59 (explaining that "when communication or the transporting of information becomes unsecured or untrustworthy, such gaps need to be accounted for and filled"). Accordingly, a need existed to improve the distribution of digital

content to enhance security of content that may be transmitted over an unsecured connection, while enabling efficient access to the content for the correct users. *Id.* at 1:51-53, 1:57-59.

C. Technical Solutions and Benefits Provided by the '749 Patent Inventions

125. The '749 Patent claims a solution to this problem with specific ways to transmit "encrypted multimedia content over an unsecured connection" to improve security and enable efficient distribution and playback of multimedia content. *See, e.g., id.* at 1:28-29. The '749 Patent invention packages decryption information with digital video in a "container file" and allows processing of that file such that decryption can occur on the video decoder. *Id.* at 5:66-6:32, FIG. 1, FIG. 2. The '749 Patent further requires that the decoder store a key table to assist subsequent decryption. *Id.* at 8:25-28. The '749 Patent claims are therefore directed to improvements to the functionality of computer systems that perform digital video decryption, decoding, and playback. The '749 Patent claims are directed to a playback device with a new structure of container file containing encrypted digital video; how a playback device is configured to decrypt, decode, and play back the new file structure (claim 1 and dependents); and the method of decrypting, decoding, and playing back that new file structure (claim 15 and dependents). Prior video container file formats did not contain this specific structure of partially encrypted frames and cryptographic information necessary for decryption and decoding. This new file structure, and the playback devices and methods used to decrypt and play back video structured in this new way, therefore were not well-known, routine, or conventional at the time of the '749 Patent invention.

126. The new structure of a container file containing encrypted digital video of the '749 invention and the playback devices and methods used to decrypt and play back video structured in this new way provide technical benefits that improve the functionality and capabilities of computer systems performing these operations. By providing partially encrypted video frames, coupled with specific cryptographic information describing the encrypted portion of each partially encrypted

frame, and requiring deciphering of frame keys using the cryptographic material, the new container file format improves the security of the video data and reduces the processing resources required to decrypt and play back the video. The '749 Patent inventions "do not secure the transmission but rather secure the data being transmitted via the unsecured connection." *See, e.g., id.* at 5:22-40. The inventions accomplish this using enciphered decryption key information in the multimedia data, and not deciphering those keys to decrypt the multimedia until the data is at the decoder and no longer being transmitted. *See, e.g., id.; see also* 6:53-7:5. As a result, "by allowing the decryption to occur on the decoder the bitstream is protected even if the connection is compromised and an unauthorized component or process intercepts the bitstream." *See, e.g., id.* at 5:37-40.

D. Prosecution History of the '749 Patent Inventions

127. The prior art identified during prosecution of the '749 Patent did not disclose at least "deciphering, at the video decoder, a frame key by which the portion of the partially encrypted frame is encrypted using the cryptographic information and a key table stored on the video decoder" and "identifying the encrypted portion of the partially encrypted frame using the block reference," as recited in claims 1 and 10 of the '749 Patent, and the claims that depend from those claims. '749 Patent File History[7], Notice of Allowance, July 17, 2019, at 3-4.

128. The '749 Patent bears a terminal disclaimer in relation to the '486 Patent.

129. During prosecution, the patent examiner did not reject any claims of the '749 Patent under 35 U.S.C. § 101. The '749 Patent issued on November 19, 2019, after the U.S. Supreme Court's decision in *Alice Corp. Pty Ltd. v. CLS Bank Int'l*, 573 U.S. 208 (2014).

[7] Cited excerpts of the '749 Patent file history attached as Exhibit 7.

E. Claims Reciting the Technical Solutions of the '749 Patent Inventions

130. The claims of the '749 Patent recite these computing improvements that provide content security benefits for video transmission and decoding. Claim 1 of the '749 Patent recites how an improved playback device decrypts and decodes on the decoder the invention's new container file structure containing encrypted digital video:

> 1. A playback device for playing back encrypted video, the playback device comprising:
> a set of one or more processors; and
> a non-volatile storage containing a playback application for causing the set of one or more processors to perform the steps of:
> receiving a container file with video data at a parser;
> extracting portions of the container file using the parser, wherein the container file comprises video data with a partially encrypted frame, cryptographic information, and a block reference that identifies a portion of the partially encrypted frame, and wherein the partially encrypted frame contains encrypted portions and unencrypted portions of data;
> providing the partially encrypted frame, the cryptographic information, and the block reference from a demultiplexer to a video decoder;
> deciphering, at the video decoder, a frame key by which the portion of the partially encrypted frame is encrypted using the cryptographic information and a key table stored on the video decoder;
> identifying the encrypted portion of the partially encrypted frame using the block reference;
> decrypting the encrypted portion of the partially encrypted frame using the frame key and the video decoder; and
> decoding the decrypted portion of the frame for rendering on a display device using the video decoder.

'749 Patent at 10:58-11:18.

131. Claim 1 recites how to improve content security during video decoding by using a novel container file format including encrypted video that is decrypted at the decoder by "deciphering a frame key" for a partially encrypted video frame on the playback device, utilizing a key table on the decoder, and "decrypting the encrypted portion of each partially encrypted frame based upon the frame key." *Id.* That is, the keys necessary to decrypt the video are protected until they are deciphered on the device. The invention recited in claim 1 solves the problem of enhancing multimedia content security by de-ciphering frame keys within a secure video decoder in a manner that was not well-understood, routine, or conventional at the time of the '749 Patent.

132. Claims 2-9 of the '749 Patent depend from claim 1, and each of claims 2-9 further describes how the invention's improved playback device is configured to decrypt and play back the new container file structure containing encrypted digital video that improves security of the video content during decoding and playback. The ordered combination of elements in each of claims 2-9, in conjunction with the elements of the claims from which they depend, therefore recite unconventional new and improved computer configurations and video container file structures that were not well-understood at the time of the '749 Patent invention.

> Claim 10 of the '749 Patent recites how to perform an improved method of playing back video encrypted in the new container file structure of the invention:
>
> 10. A method for playing back encrypted video, the method comprising:
>
> receiving a container file with video data at a parser;
>
> extracting portions of the container file using the parser, wherein the container file comprises video data with a partially encrypted frame, cryptographic information, and a block reference that identifies a portion of the partially encrypted frame, and wherein the partially encrypted frame contains encrypted portions and unencrypted portions of data;
>
> providing the partially encrypted frame, the cryptographic information, and the block reference from a demultiplexer to a video decoder;

deciphering, at the video decoder, a frame key by which the portion of the partially encrypted frame is encrypted using the cryptographic information and a key table stored on the video decoder;

identifying the encrypted portion of the partially encrypted frame using the block reference;

decrypting the encrypted portion of the partially encrypted frame using the frame key and the video decoder; and

decoding the decrypted portion of the frame for rendering on a display device using the video decoder.

'749 Patent, at 11:50-12:22.

133. Claim 10 recites how to improve content security during video decoding by using the new container file structure, reciting "deciphering a frame key" for a partially encrypted video frame on the playback device, utilizing a key table on the decoder, and "decrypting the encrypted portion of each partially encrypted frame based upon the frame key." *Id.* That is, the keys necessary to decrypt the video are protected until they are deciphered on the device. The invention recited in claim 10 solves the problem of enhancing multimedia content security by deciphering frame keys within a secure video de-coder in a manner that was not well-understood, routine, or conventional at the time of the '749 Patent invention.

134. Claims 11-18 of the '749 Patent depend from claim 10, and each of claims 11-18 further describes how to perform the invention's improved method for playing back the new container file structure containing encrypted digital video that improves security of the video content during decoding and playback on a video decoder. The ordered combination of elements in each of claims 11-18, in conjunction with the elements of the claims from which they depend, therefore recite unconventional new and improved computer processes and video container file structures that were not well-understood at the time of the '749 Patent invention.

ALLEGATIONS OF PATENT INFRINGEMENT

135. Plaintiff incorporates the allegations of all of the foregoing paragraphs as if fully restated herein.

136. As set forth below, the Accused Products incorporate, without any license to the Asserted Patents from DivX, video streaming technology protected by the Asserted Patents owned by DivX. DivX respectfully seeks relief from this Court for Defendants' infringement.

I. LG

137. LG has and continues to make, have made, use, sell, offer for sale, import, have imported, test, design, and/or market in the United States video processing devices, components thereof, and digital smart televisions containing the same that infringe the Asserted Patents.

138. LG has directly infringed, and continues to directly infringe, the Asserted Patents under 35 U.S.C. § 271(a) and (g) by making, using, selling and/or offering to sell, in this District and elsewhere in the United States, and/or importing into this District and elsewhere in the United States, certain infringing video processing devices, components thereof, and digital smart televisions containing the same, that infringe the Asserted Patents, as further described in detail in Counts I-VIII *infra*.

139. With actual notice of the Asserted Patents, LG has proceeded to directly infringe by making, using, testing, designing, selling, offering to sell, and/or importing in this District and elsewhere in the United States video processing devices, components thereof, and digital smart televisions containing the same that infringe the Asserted Patents. LG has been placed on actual notice of the Asserted Patents at least as early as September 8, 2020, by way of a letter to LG dated September 8, 2020, enclosing claim charts for each Asserted Patent. Furthermore, prior to the filing of this Complaint, LG had actual knowledge of at least the patents listed on the DivX Branding Guidelines, which includes at least one of the Asserted Patents, the '297 Patent. Finally,

by way of a notice letter containing a list of issued patents provided to LG by DivX on or around November 13, 2014, LG had actual knowledge of the patents then-owned by DivX, including the '297 Patent, which issued on September 9, 2014, patents related to the '486 and '749 Patents (*e.g.*, U.S. Patent Application No. 12/946,631, filed on Nov. 15, 2010, now U.S. Patent No. 8,781,122), and patents related to the '141 Patent (*e.g.*, U.S. Patent Application No. 12/982,413, filed on Dec. 30, 2010, now U.S. Patent No. 8,977,768, and U.S. Patent Application No. 11/970,493, filed on Jan. 7, 2008, now U.S. Patent No. 7,886,069). Additionally, the filing of this Complaint also constitutes notice in accordance with 35 U.S.C. § 287.

140. LG has also indirectly infringed, and continues to indirectly infringe, the Asserted Patents under 35 U.S.C. § 271(b) and (c). LG contributes to and induces direct infringement by LG's suppliers, such as Realtek, and others, such as application companies, application developers, retailers, and end-users. For example, on information and belief, retailers such as Best Buy provide floor demonstrations of the operation of LG televisions that infringe. Also for example, on information and belief, when an end-user connects LG televisions that infringe to the internet, such televisions download and/or activate software that facilitate the operation of the infringing systems and methods of those televisions and components thereof. LG knew and had specific intent to induce and encourage this direct infringement of the Asserted Patents by LG's customers. LG's customers' directly infringing acts that are induced and contributed to by LG include importation, sales, use, and offer for sale of articles that are covered by the Asserted Patents.

141. LG also contributes to the foregoing infringement by customers by offering to sell, selling, and importing in the United States, LG products that constitute all or a material part of the articles that practice the Asserted Patents. LG knows, or should have known, that such LG products have no substantial non-infringing uses, are a material part of the invention of each

Asserted Patent, especially made or especially adapted for use in an infringement of such patent, and not a staple article or commodity of commerce suitable for substantial non-infringing use.

142. Further, after receiving actual notice of the Asserted Patents, LG has proceeded to actively induce infringement of the Asserted Patents under 35 U.S.C. § 271(b) by: (1) inducing customers and/or other third parties to make, use, sell, offer for sale, market, advertise, and/or import video processing devices and components thereof that infringe the Asserted Patents; (2) inducing consumers and/or end users to automatically download and/or activate certain software onto the video processing devices and digital smart televisions containing the same when the devices are turned on and connected to the internet for the first time; and (3) by encouraging third party application developers to create software that enables the infringing behavior of LG's video processing devices, components thereof, and digital smart televisions containing the same, as described in detail in Counts I-VIII *infra*.

143. Additionally, LG has indirectly infringed, and continues to indirectly infringe the Asserted Patents under 35 U.S.C. § 271(c) by materially contributing to infringement of the Asserted Patents by making, using, selling, offering for sale, advertising, marketing, and/or importing video processing devices, components thereof, and digital smart televisions containing the same that infringe the Asserted Patents, and by instructing those others to infringe the Asserted Patents, as described in detail in Counts I-VIII *infra*.

144. The Accused Products include, but are not limited to, all LG video processing devices, components thereof, and digital smart televisions containing the same. Plaintiff DivX reserves the right to accuse any forthcoming LG technology not yet commercially available.

145. LG's acts of infringement have caused damage to Plaintiff. Plaintiff is entitled to recover from LG the damages incurred by Plaintiff as a result of LG's wrongful acts.

II. Realtek

146. Realtek has and continues to make, have made, use, sell, offer for sale, import, have imported, test, design, and/or market in the United States semiconductor devices that are incorporated into video processing devices, and digital smart televisions containing the same that infringe the ’486 and ’749 Patents.

147. Realtek has directly infringed, and continues to directly infringe, the ’486 and ’749 Patents under 35 U.S.C. § 271(a) and (g) by making, using, selling and/or offering to sell, in this District and elsewhere in the United States, and/or importing into this District and elsewhere in the United States, certain semiconductor devices and/or integrated circuits which are incorporated into video processing devices and digital smart televisions containing the same, that infringe the ’486 and ’749 Patents, as further described in detail in Counts III-IV and VII-VIII *infra*.

148. With actual notice of the ’486 and ’749 Patents, Realtek has proceeded to directly infringe by making, using, testing, designing, selling, offering to sell, and/or importing in this District and elsewhere in the United States, semiconductor devices and integrated circuits incorporated into video processing devices, and digital smart televisions containing the same, that infringe the ’486 and ’749 Patents. Realtek has been placed on actual notice of the ’486 and ’749 Patents at least as early as September 8, 2020 by way of a letter to Realtek dated September 8, 2020, enclosing claim charts for each of the ’486 and ’749 Patent. Additionally, the filing of this Complaint also constitutes notice in accordance with 35 U.S.C. § 287.

149. Realtek has also indirectly infringed, and continues to indirectly infringe, the ’486 and ’749 Patents under 35 U.S.C. § 271(b) and (c). Realtek contributes to and induces direct infringement by Realtek’s customer, such as LG, and others, such as application companies, application developers, retailers, and end-users. Realtek’s directly infringing acts that are induced and contributed to by Realtek include importation, sales, use, and offer for sale of articles that are

covered by the '486 and '749 Patents. For example, on information and belief, retailers such as Best Buy provide floor demonstrations of the operation of LG televisions containing Realtek components that infringe. Also for example, on information and belief, when an end-user connects televisions containing Realtek components that infringe to the internet, such televisions download and/or activate software that facilitate the operation of the infringing systems and methods of those televisions and components thereof. Realtek knew and had specific intent to induce and encourage this direct infringement of the '486 and '749 Patents by its customers. For example, Realtek "[d]emonstrate[d] [f]ull [r]ange of [c]onnectivity, [m]ultimedia, and [c]onsumer [e]lectronics [s]olutions at 2020 CES" trade show in Las Vegas from January 7th to 10th, 2020. *See, e.g.*, www.realtek.com/en/press-room/news-releases/item/realtek-to-demonstrate-full-range-of-connectivity-multimedia-and-consumer-electronics-solutions-at-2020-ces (accessed September 6, 2020) (noting that "[t]he Realtek RTD2851M is a 4K TV SoC" and with companion RTD2893 can offer "a true 8K TV solution that features 8K60Hz decoding with AV1, VP9, and HEVC decoders, 12GHz HDMI2.1 input capable of receiving an 8K data stream, super resolution, 8K noise reduction, and all related 8K picture quality processes"). Realtek's customers' directly infringing acts that are induced and contributed to by Realtek include importation, sales, use, and offer for sale of articles that are covered by the '486 and '749 Patents.

150. Realtek also contributes to the foregoing infringement by customers by offering to sell, selling, and importing in the United States, Realtek integrated circuits that constitute a material part of the articles that practice the '486 and '749 Patents. Realtek knows, or should have known, that such Realtek integrated circuits have no substantial non-infringing uses, are a material part of the invention of each '486 and '749 Patent, especially made or especially adapted for use

in an infringement of such patent, and not a staple article or commodity of commerce suitable for substantial non-infringing use.

151. Further, after receiving actual notice of the '486 and '749 Patents, Realtek has actively induced and contributed to, and continues to actively induce and contribute to the infringement of consumers and/or end users by the automatic download and/or activation of certain software to the video processing devices and digital smart televisions containing the same when the devices are, *e.g.*, turned on and connected to the internet for the first time, and by encouraging third party application developers to create software that enables the infringing behavior of Realtek's video processing devices, components thereof, and digital smart televisions containing the same, as described in detail in Counts III-IV and VII-VIII *infra*. For example, according to its own annual report published April 28, 2020, Realtek "is primarily engaged in researching, developing, manufacturing, selling of various integrated circuits and related application software." *See, e.g.*, https://www.realtek.com/images/ar/Annual_Report_2019__20200519.pdf (accessed September 6, 2020) (also noting that "…Smart TVs will become mainstream products this year, … Realtek will promote its products in key markets while providing customers with comprehensive solutions" *id.* at 76-77).

152. Additionally, Realtek has indirectly infringed, and continues to indirectly infringe the '486 and '749 Patents under 35 U.S.C. § 271(c) by materially contributing to infringement of the '486 and '749 Patents by making, using, selling, offering for sale, advertising, marketing, and/or importing semiconductor devices that are incorporated into video processing devices, and digital smart televisions containing the same, that infringe the '486 and '749 Patents, and by instructing those others, such as LG, to infringe the '486 and '749 Patents, as described in detail in Counts III-IV and VII-VIII *infra*.

153. The Accused Products include, but are not limited to, all Realtek semiconductor devices, integrated circuits, and products incorporated into video processing devices, and digital smart televisions containing the same made, used, sold, offered for sale, and/or imported by others, including but not limited to LG.

154. Realtek's acts of infringement have caused damage to Plaintiff. Plaintiff is entitled to recover from Realtek the damages incurred by Plaintiff as a result of Realtek's wrongful acts.

COUNT I
(LG Defendants' Infringement of the '297 Patent)

155. Plaintiff incorporates the allegations of all of the foregoing paragraphs as if fully restated herein.

156. Plaintiff is the assignee and lawful owner of all right, title and interest in and to the '297 Patent. The '297 Patent is valid and enforceable.

157. The LG Defendants have directly infringed, and continue to directly infringe, the '297 Patent by making, using, selling, offering for sale, or importing into the United States products that infringe the '297 Patent including, but not limited to, video processing devices, components thereof (*e.g.*, semiconductor devices and integrated circuits), and digital smart televisions containing the same made, used, sold, offered for sale, and/or imported by others, including but not limited to LG. The devices that infringe one or more claims of the '297 Patent include, but are not limited to, at least the Accused LG Products. Further discovery may reveal additional infringing products and/or models.

158. For example, and without limitation, the Accused LG Products infringe at least claims **1**,[8] 2-11, 14-17; **18**, 19-29, 32-39 of the '297 Patent. The Accused LG Products fall within

[8] Independent claims are identified in **bold**.

the scope of and include, either literally or under the doctrine of equivalents, all of the elements of the exemplary claims of the ’297 Patent.

159. For example, the LG 43UM6910PUA smart television is an exemplary product covered by at least Claim 1 of the ’297 Patent.

160. The Accused LG Products include all limitations of at least Claim 1 of the ’297 Patent. Specifically, the ’297 Patent claims a playback device configured to perform multiphase adaptive bitrate streaming by requesting portions of encoded media from a plurality of alternative streams of encoded media that are encoded at different maximum bitrates in response to changes in streaming conditions, the playback device comprising: (i) a processor; and (ii) a non-volatile storage containing an application for causing the processor to perform the steps of: (iii) establishing at least one connection for communicating with a remote server system; (iv) obtaining information from a remote server system describing at least one video track, multiple audio tracks, and multiple subtitle tracks; (v) selecting a video track from the at least one video track; (vi) requesting a header describing the selected video track; (vii) selecting an audio track from the multiple audio tracks; (viii) obtaining index information indicating the locations of audio and video data within the selected audio and video tracks; (ix) determining byte ranges to request from the selected audio and video tracks using the index information; (x) requesting byte ranges from the selected video track and the selected audio track from the remote server system; (xi) buffering received bytes of information comprising audio and video data; (xii) checking that sufficient data is buffered to commence playback and playing back the buffered audio and video data; (xiii) responding to a received seek instruction by: pausing playback; (xiv) determining byte ranges to request from the selected audio and video tracks based upon a new playback location using the index information; (xv) requesting byte ranges required to play the selected audio and video tracks

from the new playback location from the remote server; (xvi) buffering received bytes of information comprising audio and video data pending resumption of playback; and (xvii) checking that sufficient data is buffered to commence playback and playing back the buffered audio and video data.

161. For example, the LG E9 Glass 65 inch Class 4K Smart OLED TV w/AI ThinQ® (64.5" Diag), Model Number: OLED65E9PUA, includes a LG Alpha 9 Gen 2 processor configured, via a client application, to request portions of files from a remote server. For example, the LG OLED65E9PUA runs the webOS operating system and includes a "Full Web Browser," media players, GStreamer multimedia framework, and streaming applications such as Amazon Prime Video. The client application further configures the processor to commence streaming of the encoded media in a first operational phase utilizing a first set of stream switching conditions by requesting portions of the encoded media from one of the plurality of alternative streams encoded at a specified maximum bitrate. For example, the LG OLED65E9PUA supports adaptive streaming protocols such as MPEG-DASH that can seamlessly switch across different representations of the same media component.

162. The LG Defendants have, and continue to, indirectly infringe the '297 Patent by actively inducing and contributing to the infringement of the '297 Patent by others, such as semiconductor manufacturers, customers, resellers, and retailers. For example, the LG Defendants have induced semiconductor manufacturers to produce components that when incorporated into the LG Defendants' downstream products, enable their infringing behavior, and such downstream products are then made, sold, offered for sale, and/or imported throughout the United States, including within this District.

163. Furthermore, the LG Defendants have actively induced and contributed to, and continue to actively induce and contribute to the infringement of consumers and/or end users by the automatic download of certain software to the video processing devices and digital smart televisions containing the same when the devices are turned on and connected to the internet for the first time, and by encouraging third party application developers to create software that enables the infringing behavior of the LG Defendants' video processing devices, components thereof, and digital smart televisions containing the same.

164. The LG Defendants specifically intended these others, such as semiconductor manufacturers, customers, resellers, and retailers, to infringe the '297 Patent and knew that these others perform acts that constituted direct infringement. For example, the LG Defendants designed the Accused LG Products such that they would each infringe the '297 Patent if made, used, sold, offered for sale, or imported into the United States. The LG Defendants provided, directly or indirectly, Accused LG Products to others, such as, but not limited to, customers, knowing and intending that those others would use, sell, offer for sale, and/or import in and into the United States downstream products that include the Accused LG Products, thereby directly infringing one or more claims of the '297 Patent.

165. The Accused LG Products have no substantial non-infringing uses and are a material part of the invention. Any manufacture, use, sale, offer for sale, or importation in or into the United States of an Accused LG Product, a component thereof, or a downstream product containing the same infringes the '297 Patent. Thus, the Accused LG Products have no substantial non-infringing uses. Moreover, the Accused LG Products that encompass semiconductor devices and integrated circuits provide vital functionality to the downstream products, such Accused LG Products constitute a material part of the invention claimed in the '297 Patent.

166. The LG Defendants have had knowledge of the '297 Patent since at least as of receiving letters dated September 8, 2020, enclosing claim charts for the Asserted Patents. Furthermore, prior to the filing of this Complaint, the LG Defendants had actual knowledge of at least the patents listed on the DivX Branding Guidelines, which includes at least one of the Asserted Patents, the '297 Patent. Finally, by way of a notice letter containing a list of issued patents provided to the LG Defendants by DivX on or around November 13, 2014, the LG Defendants had actual knowledge of the patents then-owned by DivX, including the '297 Patent, which issued on September 9, 2014.

167. The LG Defendants' continued infringement of the '297 Patent has damaged and will continue to damage Plaintiff.

168. Plaintiff is entitled to recover damages adequate to compensate it for the LG Defendants' infringement.

COUNT II
(LG Defendants' Willful Infringement of the '297 Patent)

169. Plaintiff incorporates the allegations of all of the foregoing paragraphs as if fully restated herein.

170. The LG Defendants have willfully infringed and/or do willfully infringe the '297 Patent.

171. The LG Defendants had actual notice of the '297 Patent by way of a notice letter provided to LG by DivX on or around November 13, 2014 containing a list of issued patents, including the '297 Patent, which issued on September 9, 2014. Further, the LG Defendants had actual knowledge of at least the patents listed on the DivX Branding Guidelines, which includes at least one of the Asserted Patents, the '297 Patent. Finally, the LG Defendants received actual notice of the '297 Patent at least as early as September 8, 2020 by way of letters dated September

8, 2020, enclosing claim charts for the Asserted Patents. After receiving such actual notice of the '297 Patent, the LG Defendants proceeded to make, use, test, sell, and/or offer to sell in this District and elsewhere in the United States, and import into this District and elsewhere in the United States, the Accused LG Products.

172. On information and belief, the LG Defendants engaged in such activities despite an objectively high likelihood that their actions constituted infringement of valid patents, including the '297 Patent. The LG Defendants knew and should have known that their actions would cause direct and indirect infringement of the '297 Patent.

COUNT III
(Defendants' Infringement of the '486 Patent)

173. Plaintiff incorporates the allegations of all of the foregoing paragraphs as if fully restated herein.

174. Plaintiff is the assignee and lawful owner of all right, title and interest in and to the '486 Patent. The '486 Patent is valid and enforceable.

175. Defendants have directly infringed, and continue to directly infringe, the '486 Patent by making, using, selling, offering for sale, or importing into the United States products that infringe the '486 Patent including, but not limited to, video processing devices, components thereof (*e.g.*, semiconductor devices and integrated circuits), and digital smart televisions containing the same made, used, sold, offered for sale, and/or imported by others, including but not limited to LG. The devices that infringe one or more claims of the '486 Patent include, but are not limited to, at least the Accused Products. Further discovery may reveal additional infringing products and/or models.

176. For example, and without limitation, the Accused Products infringe at least claims **1**, 2-5, 7-10, 13, 14; **15**, 16-19, 21-25 of the '486 Patent. The Accused Products fall within the

scope of and include, either literally or under the doctrine of equivalents, all of the elements of the exemplary claims of the ’486 Patent.

177. For example, the LG 43UM6910PUA smart television is an exemplary product covered by at least Claim 1 of the ’486 Patent.

178. Also for example, the Realtek RTD287o system-on-chip (“SOC”) (on information and belief, also packaged as the LGE9551 SoC) is also an exemplary product covered by at least Claim 1 of the ’486 Patent. On information and belief, many other products provided by, and to be provided by LG and/or Realtek infringe the ’486 Patent.

179. The Accused Products include all limitations of at least Claim 1 of the ’486 Patent. Specifically, the ’486 Patent claims a playback device for playing back encrypted video, the playback device comprising: (i) a set of one or more processors; (ii) and a non-volatile storage containing a playback application for causing the set of one or more processors to perform the steps of: (iii) receiving a container file with video data at a parser; extracting portions of the container file using the parser, (iv) wherein the container file comprises: video data with a plurality of partially encrypted frames, wherein each partially encrypted frame contains encrypted portions and unencrypted portions of data; and (v) a set of cryptographic information describing the encrypted portion of each partially encrypted frame, (vi) where cryptographic information for a partially encrypted frame comprises: cryptographic material for the encrypted portion of the partially encrypted frame, and a block reference that identifies the encrypted portion of the partially encrypted frame, (vii) providing each partially encrypted frame, the cryptographic material for each partially encrypted frame, and the block reference for each partially encrypted frame from the parser to a video decoder; (viii) identifying the encrypted portion of each partially encrypted frame using the block reference for each partially encrypted frame; (ix) deciphering a frame key

for each partially encrypted frame using the cryptographic material for each partially encrypted frame to produce a frame key for each partially encrypted frame; (x) decrypting the encrypted portion of each partially encrypted frame based upon the frame key for each partially encrypted frame using the video decoder; and (xi) decoding each decrypted frame for rendering on a display device using the video decoder.

180. For example, the LG OLED65E9PUA, runs the webOS operating system, and includes a LG Alpha 9 Gen 2 processor and the Samsung K4A4G165WE 4Gb DDR4 SDRAM memory. The LG Alpha 9 Gen 2 processor can be caused to receive container files, including but not limited to MP4 container files. At least one of the LG OLED65E9PUA's supported streaming protocol clients, for example, a MPEG-DASH client, in conjunction with one of the LG OLED65E9PUA's supported DRM clients, for example PlayReady, receives MP4 container file(s) with video data at a segment parser where portions of the container file are extracted. The container file comprises partially frame encrypted video data with a set of cryptographic information describing the encrypted portion of each partially encrypted frame. For example, MP4 container files include multiple video segments that contain partial frame encryption data, for example Sample Auxiliary Information Offset Boxes ('saio') and Sample Auxiliary Size Boxes ('saiz'). Further, the LG OLED65E9PUA provides each partially encrypted frame, the cryptographic material for each partially encrypted frame, and the block reference for each partially encrypted frame from the parser to a video decoder. For example, the Gstreamer pipeline on webOS utilizes the video decoders on the LG Alpha 9 Gen 2 processor to decode the buffered media for playback. The LG Alpha 9 Gen 2 processor provides hardware acceleration of video and audio processing, including without limitation, a hardwired MFD (G1 Decoder), G2 Decoder,

and HEVC Decoder video decoders. Also for example, the Gstreamer pipeline on webOS includes a video decoder to decode each decrypted frame, and the video data is decoded for display.

181. For example, the Realtek video processing system and components thereof (comprising a main board hardware and integrated operating system, middleware, application program, video processing, and/or digital rights management (DRM) software that runs, *e.g.*, on the LG 43UM6910PUA smart television), includes an RTD287o SoC that (on information and belief) is designed, manufactured, and packaged for LG by Realtek as the LGE9551, and the Samsung KLM4G1FETE 4Gb eMMC memory. The RTD287o can be caused to receive container files, including but not limited to MP4 container files. At least one of the streaming protocol clients for at least one of the products containing the Realtek video processing system, *e.g.*, LG 43UM6910PUA's MPEG-DASH client, in conjunction with one of the at least one of the products containing the Realtek video processing system, *e.g.*, LG 43UM6910PUA's supported DRM clients, for example PlayReady, receives MP4 container file(s) with video data at a segment parser where portions of the container file are extracted. The container file comprises partially frame encrypted video data with a set of cryptographic information describing the encrypted portion of each partially encrypted frame. For example, MP4 container files include multiple video segments that contain partial frame encryption data, for example Sample Auxiliary Information Offset Boxes ('saio') and Sample Auxiliary Size Boxes ('saiz'). Further, the at least one of the products containing the Realtek video processing system, *e.g.*, LG 43UM6910PUA, provides each partially encrypted frame, the cryptographic material for each partially encrypted frame, and the block reference for each partially encrypted frame from the parser to a video decoder. For example, the Gstreamer pipeline on the LG 43UM6910PUA's webOS utilizes the video decoders on the RTD287o to decode the buffered media for playback. For example, the RTD287o processor

provides hardware acceleration of video and audio processing, including without limitation, a hardwired MFD (G1 Decoder), G2 Decoder, and HEVC Decoder video decoders. Also for example, the Gstreamer pipeline on webOS includes a video decoder to decode each decrypted frame, and the video data is decoded for display.

182. Defendants have, and continue to, indirectly infringe the '486 Patent by actively inducing and contributing to the infringement of the '486 Patent by others, such as semiconductor manufacturers, customers, resellers, and retailers. For example, Defendants have induced semiconductor manufacturers to produce components that when incorporated into Defendants' downstream products, enable their infringing behavior, and such downstream products are then made, sold, offered for sale, and/or imported throughout the United States, including within this District.

183. Furthermore, Defendants have actively induced and contributed to, and continue to actively induce and contribute to the infringement of consumers and/or end users by the automatic download of certain software to the video processing devices and digital smart televisions containing the same when the devices are turned on and connected to the internet for the first time, and by encouraging third party application developers to create software that enables the infringing behavior of Defendants' video processing devices, components thereof, and digital smart televisions containing the same.

184. Defendants specifically intended these others, such as semiconductor manufacturers, customers, resellers, and retailers, to infringe the '486 Patent and knew that these others perform acts that constituted direct infringement. For example, Defendants designed the Accused Products such that they would each infringe the '486 Patent if made, used, sold, offered for sale, or imported into the United States. Defendants provided, directly or indirectly, Accused

Products to others, such as, but not limited to, customers, knowing and intending that those others would use, sell, offer for sale, and/or import in and into the United States downstream products that include the Accused Products, thereby directly infringing one or more claims of the '486 Patent.

185. The Accused Products have no substantial non-infringing uses and are a material part of the invention. Any manufacture, use, sale, offer for sale, or importation in or into the United States of an Accused Product, a component thereof, or a downstream product containing the same infringes the '486 Patent. Thus, the Accused Products have no substantial non-infringing uses. Moreover, the Accused Products that encompass semiconductor devices and integrated circuits provide vital functionality to the downstream products, such Accused Products constitute a material part of the invention claimed in the '486 Patent.

186. Defendants have had knowledge of the '486 Patent since at least as of receiving letters dated September 8, 2020, enclosing claim charts for the Asserted Patents. Also, by way of a notice letter containing a list of issued patents provided to LG by DivX on or around November 13, 2014, LG had actual knowledge of the patents then-owned by DivX, including the patents related to the '486 Patent.

187. Defendants' continued infringement of the '486 Patent has damaged and will continue to damage Plaintiff.

188. Plaintiff is entitled to recover damages adequate to compensate it for Defendants' infringement.

COUNT IV
(Defendants' Willful Infringement of the '486 Patent)

189. Plaintiff incorporates the allegations of all of the foregoing paragraphs as if fully restated herein.

190. Defendants have willfully infringed and/or do willfully infringe the ’486 Patent.

191. Defendants received actual notice of the ’486 Patent at least as early as September 8, 2020 by way of letters dated September 8, 2020, enclosing claim charts for the Asserted Patents. After receiving such actual notice of the ’486 Patent, Defendants proceeded to make, use, test, sell, and/or offer to sell in this District and elsewhere in the United States, and import into this District and elsewhere in the United States, the Accused Products.

192. On information and belief, Defendants engaged in such activities despite an objectively high likelihood that their actions constituted infringement of valid patents, including the ’486 Patent. Defendants knew and should have known that their actions would cause direct and indirect infringement of the ’486 Patent.

COUNT V
(LG Defendants’ Infringement of the ’141 Patent)

193. Plaintiff incorporates the allegations of all of the foregoing paragraphs as if fully restated herein.

194. Plaintiff is the assignee and lawful owner of all right, title and interest in and to the ’141 Patent. The ’141 Patent is valid and enforceable.

195. The LG Defendants have directly infringed, and continue to directly infringe, the ’141 Patent by making, using, selling, offering for sale, or importing into the United States products that infringe the ’141 Patent including, but not limited to, video processing devices, components thereof (*e.g.*, semiconductor devices and integrated circuits), and digital smart televisions containing the same made, used, sold, offered for sale, and/or imported by others, including but not limited to LG. The devices that infringe one or more claims of the ’141 Patent include, but are not limited to, at least the Accused LG Products. Further discovery may reveal additional infringing products and/or models.

196. For example, and without limitation, the Accused LG Products infringe at least claims **1**, 2, 3, 5-11; **20**, 21, 22, 26-30 of the '141 Patent. The Accused LG Products fall within the scope of and include, either literally or under the doctrine of equivalents, all of the elements of the exemplary claims of the '141 Patent.

197. For example, the LG 43UM6910PUA smart television is an exemplary product covered by at least Claim 1 of the '141 Patent.

198. The Accused LG Products include all of the limitations of at least Claim 1 of the '141 Patent. Specifically, the '141 Patent claims a playback device, comprising: (i) a processor; and (ii) a non-volatile storage containing an application for causing the processor to perform the steps of: (iii) establishing at least one connection for communicating with a remote server system; (iv) obtaining information from a remote server system describing at least one video track, multiple audio tracks, and multiple subtitle tracks; (v) selecting a video track from the at least one video track; (vi) requesting a header describing the selected video track; (vii) selecting an audio track from the multiple audio tracks; (viii) obtaining index information indicating the locations of audio and video data within the selected audio and video tracks; (ix) determining byte ranges to request from the selected audio and video tracks using the index information; (x) requesting byte ranges from the selected video track and the selected audio track from the remote server system; (xi) buffering received bytes of information comprising audio and video data; (xii) checking that sufficient data is buffered to commence playback and playing back the buffered audio and video data; (xiii) responding to a received seek instruction by: pausing playback; determining byte ranges to request from the selected audio and video tracks based upon a new playback location using the index information; (xiv) requesting byte ranges required to play the selected audio and video tracks from the new playback location from the remote server; (xv) buffering received bytes of

information comprising audio and video data pending resumption of playback; and (xvi) checking that sufficient data is buffered to commence playback and playing back the buffered audio and video data.

199. For example, the LG OLED65E9PUA, runs the webOS operating system, and includes a LG Alpha 9 Gen 2 processor and the Samsung K4A4G165WE 4Gb DDR4 SDRAM memory. The LG Alpha 9 Gen 2 processor is configured to establish a connection for communication with a remote server (*e.g.*, connected to the Internet via Wi-Fi). The LG OLED65E9PUA obtains information from a remote server system describing at least one video track, multiple audio tracks, and multiple subtitle tracks. For example, the multimedia content available at the server may consist of several media components (*e.g.*, audio, video, text), each of which may have different characteristics. For example, the MPEG-DASH client selects the appropriate encoded alternative from information contained in the Media Presentation Description (MPD), including any associated description of a manifest of the available content, its various alternatives, their URL addresses, their byte ranges, and other characteristics. Also, the LG OLED65E9PUA obtains index information indicating the locations of audio and video data within the selected audio and video tracks. For example, the MPEG-DASH client receives Media Presentation Description (MPD) from the server. The LG OLED65E9PUA determines byte ranges to request from the selected audio and video tracks using the index information. For example, when using MPEG-DASH, the MPEG-DASH client selects the appropriate encoded alternative stream using information contained in the MPD, including but not limited to the HTTP-URL(s) and byte range for each accessible segment. The LG OLED65E9PUA further requests the header associated with the selected appropriate alternative stream. The LG OLED65E9PUA buffers received bytes of information comprising audio and video data. For example, after appropriate

buffering to allow for network throughput variations, the MPEG-DASH client decides how to adapt to the available bandwidth by fetching segments of different alternative streams (with lower or higher bitrate) to maintain an adequate buffer. Also, the LG OLED65E9PUA requests byte ranges required to play the selected audio and video tracks from the new playback location from the remote server.

200. The LG Defendants have, and continue to, indirectly infringe the '141 Patent by actively inducing and contributing to the infringement of the '141 Patent by others, such as semiconductor manufacturers, customers, resellers, and retailers. For example, the LG Defendants have induced semiconductor manufacturers to produce components that when incorporated into the LG Defendants' downstream products, enable their infringing behavior, and such downstream products are then made, sold, offered for sale, and/or imported throughout the United States, including within this District.

201. Furthermore, the LG Defendants have actively induced and contributed to, and continue to actively induce and contribute to the infringement of consumers and/or end users by the automatic download of certain software to the video processing devices and digital smart televisions containing the same when the devices are turned on and connected to the internet for the first time, and by encouraging third party application developers to create software that enables the infringing behavior of the LG Defendants' video processing devices, components thereof, and digital smart televisions containing the same.

202. The LG Defendants specifically intended these others, such as semiconductor manufacturers, customers, resellers, and retailers, to infringe the '141 Patent and knew that these others perform acts that constituted direct infringement. For example, the LG Defendants designed the Accused LG Products such that they would each infringe the '141 Patent if made, used, sold,

offered for sale, or imported into the United States. The LG Defendants provided, directly or indirectly, Accused LG Products to others, such as, but not limited to, customers, knowing and intending that those others would use, sell, offer for sale, and/or import in and into the United States downstream products that include the Accused LG Products, thereby directly infringing one or more claims of the '141 Patent.

203. The Accused LG Products have no substantial non-infringing uses and are a material part of the invention. Any manufacture, use, sale, offer for sale, or importation in or into the United States of an Accused LG Product, a component thereof, or a downstream product containing the same infringes the '141 Patent. Thus, the Accused LG Products have no substantial non-infringing uses. Moreover, the Accused LG Products that encompass semiconductor devices and integrated circuits provide vital functionality to the downstream products, such Accused LG Products constitute a material part of the invention claimed in the '141 Patent.

204. The LG Defendants have had knowledge of the '141 Patent since at least as of receiving letters dated September 8, 2020, enclosing claim charts for the Asserted Patents. Also, by way of a notice letter containing a list of issued patents provided to LG by DivX on or around November 13, 2014, LG had actual knowledge of the patents then-owned by DivX, including the patents related to the '141 Patent.

205. The LG Defendants' continued infringement of the '141 Patent has damaged and will continue to damage Plaintiff.

206. Plaintiff is entitled to recover damages adequate to compensate it for the LG Defendants' infringement.

COUNT VI
(LG Defendants' Willful Infringement of the '141 Patent)

207. Plaintiff incorporates the allegations of all of the foregoing paragraphs as if fully restated herein.

208. The LG Defendants have willfully infringed and/or do willfully infringe the '141 Patent.

209. The LG Defendants received actual notice of the '141 Patent at least as September 8, 2020 by way of letters dated September 8, 2020, enclosing claim charts for the Asserted Patents. Also, by way of a notice letter containing a list of issued patents provided to LG by DivX on or around November 13, 2014, LG had actual knowledge of the patents then-owned by DivX, including the patents related to the '141 Patent. After receiving such actual notice of the '141 Patent, the LG Defendants proceeded to make, use, test, sell, and/or offer to sell in this District and elsewhere in the United States, and import into this District and elsewhere in the United States, the Accused LG Products.

210. On information and belief, the LG Defendants engaged in such activities despite an objectively high likelihood that their actions constituted infringement of valid patents, including the '141 Patent. The LG Defendants knew and should have known that their actions would cause direct and indirect infringement of the '141 Patent.

COUNT VII
(Defendants' Infringement of the '749 Patent)

211. Plaintiff incorporates the allegations of all of the foregoing paragraphs as if fully restated herein.

212. Plaintiff is the assignee and lawful owner of all right, title and interest in and to the '749 Patent. The '749 Patent is valid and enforceable.

213. Defendants have directly infringed, and continue to directly infringe, the '749 Patent by making, using, selling, offering for sale, or importing into the United States products that infringe the '749 Patent including, but not limited to, video processing devices, components thereof (*e.g.*, semiconductor devices and integrated circuits), and digital smart televisions containing the same made, used, sold, offered for sale, and/or imported by others, including but not limited to LG. The devices that infringe one or more claims of the '749 Patent include, but are not limited to, at least the Accused Products. Further discovery may reveal additional infringing products and/or models.

214. For example, and without limitation, the Accused Products infringe at least claims **1**, 2-9; **10**, 11-18 of the '749 Patent. The Accused Products fall within the scope of and include, either literally or under the doctrine of equivalents, all of the elements of the exemplary claims of the '749 Patent.

215. For example, the LG 43UM6910PUA smart television is an exemplary product covered by at least Claim 1 of the '749 Patent.

216. Also for example, the Realtek RTD287o system-on-chip ("SOC") (on information and belief, also packaged as the LGE9551 SoC) is also an exemplary product covered by at least Claim 1 of the '749 Patent. On information and belief, many other products provided by, and to be provided by LG and/or Realtek infringe the '749 Patent.

217. The Accused Products include all of the limitations of at least Claim 1 of the '749 Patent. Specifically, the '749 Patent claims a playback device for playing back encrypted video, the playback device comprising: (i) a set of one or more processors; and (ii) a non-volatile storage containing a playback application for causing the set of one or more processors to perform the steps of: (iii) receiving a container file with video data at a parser; extracting portions of the

container file using the parser, (iv) wherein the container file comprises video data with a partially encrypted frame, cryptographic information, and a block reference that identifies a portion of the partially encrypted frame, and wherein the partially encrypted frame contains encrypted portions and unencrypted portions of data; (v) providing the partially encrypted frame, the cryptographic information, and the block reference from a demultiplexer to a video decoder; (vi) deciphering, at the video decoder, a frame key by which the portion of the partially encrypted frame is encrypted using the cryptographic information and a key table stored on the video decoder; (vii) identifying the encrypted portion of the partially encrypted frame using the block reference; decrypting the encrypted portion of the partially encrypted frame using the frame key and the video decoder; and (viii) decoding the decrypted portion of the frame for rendering on a display device using the video decoder.

218. For example, the LG OLED65E9PUA, runs the webOS operating system, and includes a LG Alpha 9 Gen 2 processor and the Samsung K4A4G165WE 4Gb DDR4 SDRAM memory. The LG Alpha 9 Gen 2 processor can be caused to receive container files, including but not limited to MP4 container files. The LG OLED65E9PUA supports streaming protocol clients, for example, a MPEG-DASH client, in conjunction with one of the LG OLED65E9PUA's supported DRM clients, for example PlayReady, and receives MP4 container file(s) with video data at a segment parser where portions of the container file are extracted. The container file comprises partial frame encrypted video data with a set of cryptographic information describing the encrypted portion of each partially encrypted frame. For example, MP4 container files include multiple video segments that contain partial frame encryption data, for example Sample Auxiliary Information Offset Boxes ('saio') and Sample Auxiliary Size Boxes ('saiz'). The LG OLED65E9PUA provides the partially encrypted frame, the cryptographic information, and the

block reference from a demultiplexer to a video decoder. For example, the Gstreamer pipeline on webOS includes a video decoder that receives the block reference from the video parser. Also for example, the Gstreamer pipeline on webOS includes a video decoder to decode each decrypted frame, and the video data is decoded for display.

219. For example, the Realtek video processing system and components thereof (comprising a main board hardware and integrated operating system, middleware, application program, video processing, and/or digital rights management (DRM) software that runs, *e.g.*, on the LG 43UM6910PUA smart television), includes an RTD287o SoC that (on information and belief) is designed, manufactured, and packaged for LG by Realtek as the LGE9551, and the Samsung KLM4G1FETE 4Gb eMMC memory. The RTD287o can be caused to receive container files, including but not limited to MP4 container files. At least one of the streaming protocol clients for at least one of the products containing the Realtek video processing system, *e.g.*, the LG 43UM6910PUA, for example, a MPEG-DASH client, in conjunction with at least one of the products containing the Realtek video processing system, *e.g.*, the LG 43UM6910PUA's supported DRM clients, for example PlayReady, and receives MP4 container file(s) with video data at a segment parser where portions of the container file are extracted. The container file comprises partial frame encrypted video data with a set of cryptographic information describing the encrypted portion of each partially encrypted frame. For example, MP4 container files that contain partial frame encryption data, for example Sample Auxiliary Information Offset Boxes ('saio') and Sample Auxiliary Size Boxes ('saiz'). At least one of the products containing the Realtek video processing system, *e.g.*, the LG 43UM6910PUA, provides the partially encrypted frame, the cryptographic information, and the block reference from a demultiplexer to a video decoder. For example, the RTD287o processor provides hardware acceleration of video and audio

processing, including without limitation, a hardwired MFD (G1 Decoder), G2 Decoder, and HEVC Decoder video decoders. Also for example, the Gstreamer pipeline on webOS includes a video decoder to decode each decrypted frame, and the video data is decoded for display.

220. Defendants have, and continue to, indirectly infringe the '749 Patent by actively inducing and contributing to the infringement of the '749 Patent by others, such as semiconductor manufacturers, customers, resellers, and retailers. For example, Defendants have induced semiconductor manufacturers to produce components that when incorporated into Defendants' downstream products, enable their infringing behavior, and such downstream products are then made, sold, offered for sale, and/or imported throughout the United States, including within this District.

221. Furthermore, Defendants have actively induced and contributed to, and continue to actively induce and contribute to the infringement of consumers and/or end users by the automatic download of certain software to the video processing devices and digital smart televisions containing the same when the devices are turned on and connected to the internet for the first time, and by encouraging third party application developers to create software that enables the infringing behavior of Defendants' video processing devices, components thereof, and digital smart televisions containing the same.

222. Defendants specifically intended these others, such as semiconductor manufacturers, customers, resellers, and retailers, to infringe the '749 Patent and knew that these others perform acts that constituted direct infringement. For example, Defendants designed the Accused Products such that they would each infringe the '749 Patent if made, used, sold, offered for sale, or imported into the United States. Defendants provided, directly or indirectly, Accused Products to others, such as, but not limited to, customers, knowing and intending that those others

would use, sell, offer for sale, and/or import in and into the United States downstream products that include the Accused Products, thereby directly infringing one or more claims of the '749 Patent.

223. The Accused Products have no substantial non-infringing uses and are a material part of the invention. Any manufacture, use, sale, offer for sale, or importation in or into the United States of an Accused Product, a component thereof, or a downstream product containing the same infringes the '749 Patent. Thus, the Accused Products have no substantial non-infringing uses. Moreover, the Accused Products that encompass semiconductor devices and integrated circuits provide vital functionality to the downstream products, such Accused Products constitute a material part of the invention claimed in the '749 Patent.

224. Defendants have had knowledge of the '749 Patent since at least as of receiving letters dated September 8, 2020, enclosing claim charts for the Asserted Patents. Also, by way of a notice letter containing a list of issued patents provided to LG by DivX on or around November 13, 2014, LG had actual knowledge of the patents then-owned by DivX, including the patents related to the '749 Patent.

225. Defendants' continued infringement of the '749 Patent has damaged and will continue to damage Plaintiff.

226. Plaintiff is entitled to recover damages adequate to compensate it for Defendants' infringement.

COUNT VIII
(Defendants' Willful Infringement of the '749 Patent)

227. Plaintiff incorporates the allegations of all of the foregoing paragraphs as if fully restated herein.

228. Defendants have willfully infringed and/or do willfully infringe the '749 Patent.

229. Defendants received actual notice of the '749 Patent at least as early as September 8, 2020 by way of letters dated September 8, 2020, enclosing claim charts for the Asserted Patents. Also, by way of a notice letter containing a list of issued patents provided to LG by DivX on or around November 13, 2014, LG had actual knowledge of the patents then-owned by DivX, including the patents related to the '749 Patent. After receiving such actual notice of the '749 Patent, Defendants proceeded to make, use, test, sell, and/or offer to sell in this District and elsewhere in the United States, and import into this District and elsewhere in the United States, the Accused Products.

230. On information and belief, Defendants engaged in such activities despite an objectively high likelihood that their actions constituted infringement of valid patents, including the '749 Patent. Defendants knew and should have known that their actions would cause direct and indirect infringement of the '749 Patent.

PRAYER FOR RELIEF

WHEREFORE, Plaintiff respectfully requests the following relief:

a) A judgment that the Asserted Patents are valid and enforceable;

b) A judgment that the LG Defendants have infringed, directly and indirectly, either literally or under the Doctrine of Equivalents, one or more claims of the '297 Patent;

c) A judgment that the LG Defendants' infringement of the '297 Patent was willful, and that the LG Defendants' continued infringement of the '297 Patent is willful;

d) A judgment that Defendants have infringed, directly and indirectly, either literally or under the Doctrine of Equivalents, one or more claims of the '486 Patent;

e) A judgment that Defendants' infringement of the '486 Patent was willful, and that Defendants' continued infringement of the '486 Patent is willful;

f) A judgment that the LG Defendants have infringed, directly and indirectly, either literally or under the Doctrine of Equivalents, one or more claims of the '141 Patent;

g) A judgment that the LG Defendants' infringement of the '141 Patent was willful, and that the LG Defendants' continued infringement of the '141 Patent is willful;

h) A judgment that Defendants have infringed, directly and indirectly, either literally or under the Doctrine of Equivalents, one or more claims of the '749 Patent;

i) A judgment that Defendants' infringement of the '749 Patent was willful, and that Defendants' continued infringement of the '749 Patent is willful;

j) A judgment that awards Plaintiff all appropriate damages under 35 U.S.C. § 284 for Defendants' past infringement, and any continuing or future infringement of the Asserted Patents, including pre or post judgment interest, costs, and disbursements as justified under 35 U.S.C. § 284 and, if necessary to adequately compensate Plaintiff for Defendants' infringement, an accounting:

i. that Plaintiff be awarded enhanced damages by reason of the LG Defendants' willful infringement of the '297 Patent;

ii. that Plaintiff be awarded enhanced damages by reason of Defendants' willful infringement of the '486 Patent;

iii. that Plaintiff be awarded enhanced damages by reason of the LG Defendants' willful infringement of the '141 Patent;

iv. that Plaintiff be awarded enhanced damages by reason of Defendants' willful infringement of the '749 Patent;

vi. that this case be declared exceptional within the meaning of 35 U.S.C. § 285 and that Plaintiff be awarded its reasonable attorneys' fees against Defendants incurred in prosecuting this action;

vii. that Plaintiff be awarded costs and expenses incurred in prosecuting this action; and

k) A judgment that Plaintiff be awarded such further relief at law or in equity as the Court deems just and proper.

DEMAND FOR JURY TRIAL

Pursuant to Fed. R. Civ. P. 38, Plaintiff hereby demands trial by jury on all claims and issues so triable.

Dated: March 23, 2021

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Respectfully submitted,

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