

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

STINGRAY GROUP INC. AND STINGRAY MUSIC USA, INC.,
PETITIONER,

v.

EDWIN A. HERNANDEZ-MONDRAGON,
PATENT OWNER.

CASE NO. IPR2025-00349
U.S. PATENT NO. 10,123,074

DECLARATION OF MR. STUART LIPOFF

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TABLE OF EXHIBITS

EX-NO.	DESCRIPTION
Ex-1001	The '074 Patent.
Ex-1002	This Declaration
Ex-1003	U.S. Patent No. 8,954,600 to Avellan, et al. ("Avellan"), which was filed on March 2, 2012.
Ex-1004	U.S. Patent No. 8,819,043 to Durante, et al. ("Durante"), which was filed on November 9, 2010.
Ex-1005	U.S. Patent No. 9,635,075 to Ma, et al. ("Ma"), which was filed on March 8, 2010.
Ex-1006	U.S. Patent No. 6,463,445 to Suzuki, et al. ("Suzuki"), which was filed on September 30, 1999.
Ex-1007	U.S. Patent Application Publication No. 2004/0031052 to Wannamaker, et al. ("Wannamaker"), which was published on February 12, 2004.
Ex-1008	U.S. Patent No. 7,778,279 to Heikens, et al. ("Heikens"), which was filed on June 5, 2007.
Ex-1009	U.S. Patent No. 9,264,750 to Matthews, et al. ("Matthews"), which was filed on December 23, 2010.
Ex-1010	U.S. Patent No. 9,240,966 to Wilsher, et al. ("Wilsher"), which was filed on May 8, 2014.
Ex-1011	Prosecution History of the '074 Patent.

LIST OF APPENDICES

Appendix A. *Curriculum Vitae* of Mr. Stuart Lipoff

LIST OF CHALLENGED CLAIMS

Element	Claim Language
Claim 1	
Preamble 1	A computer-implemented method comprising:
Element 1a	receiving, from a content provider, a request for at least one media stream for playback on a broadcast media channel, wherein the at least one media stream includes a plurality of multimedia items of different types;
Element 1b	obtaining content corresponding to the plurality of multimedia items from at least one source offering the content in at least one first format;
Element 1c	rendering a web page by a browser using the content;
Element 1d	generating a temporal sequence of screen captures of the rendered web page, where each screen capture defines all the content of the web page at a given time, and at least two adjacent screen captures illustrate a dynamic change of at least a portion of the content over time;
Element 1e	assembling the at least one media stream using the temporal sequence of screen captures; and
Element 1f	providing the at least one media stream to the content provider for broadcast on the broadcast media channel.
Claim 2	
Element 2a	The method of claim 1, wherein the obtaining comprises: retrieving, for each of the plurality of multimedia items, at least one audio file corresponding to an audio component of the multimedia item and a plurality of screen captures corresponding to a video component of the multimedia item.
Claim 3	
Element 3a	The method of claim 2, wherein the generating comprises: combining the plurality of screen captures and the at least one audio file to create each of the plurality of multimedia items.
Claim 4	
Element 4a	The method of claim 2, wherein the retrieving of the plurality of screen captures comprises obtaining the plurality of screen captures from a playback of a video on the at least one webpage.
Claim 5	
Element 5a	The method of claim 4, wherein the combining of the plurality of screen captures comprises metadata corresponding to at least one of

Element	Claim Language
	a song title, an artist, and a music genre.
Claim 6	
Element 6a	The method of claim 1, further comprising: identifying the at least one webpage based on a channel identifier associated with the broadcast media channel.
Claim 7	
Element 7a	The method of claim 1, further comprising: querying the content provider to determine the second format, wherein the second format corresponds to a Moving Picture Experts Group (MPEG) format.
Claim 8	
Element 8a	The method of claim 3, further comprising: detecting a change at the at least one webpage corresponding to at least one of the plurality of multimedia items;
Element 8b	in response to detecting the change, retrieving a new plurality of screen captures from the at least one webpage for the at least one of the plurality of multimedia items; and
Element 8c	reassembling the at least one of the plurality of multimedia items using the new plurality of screen captures to yield an updated multimedia item.
Claim 9	
Element 9a	The method of claim 1, wherein the content provider is a cable television operator or a satellite television operator.
Claim 10	
Element 10a	The method of claim 1, wherein providing the at least one media stream to the content provider comprises streaming the at least one media stream to an MPEG multiplexer associated with the content provider.
Claim 11	
Element 11a	The method of claim 1, further comprising: provisioning, on at least one server, at least one virtual machine for performing the receiving, obtaining, generating, assembling, and providing.
Claim 12	
Preamble 12	A system comprising:
Element 12a	at least one processor;
Element 12b	a computer-readable storage medium having stored therein instructions which, when executed by the processor, cause the at least one processor to perform operations comprising:

Element	Claim Language
Element 12c	receive, from a content provider, a request for at least one media stream for playback on a broadcast media channel, the at least one media stream including a plurality of multimedia items of different types
Element 12d	retrieve, from a cloud based service, multimedia content corresponding to the plurality of multimedia items, the multimedia content in a first format;
Element 12e	render a web page by a browser using the multimedia content;
Element 12f	generate a temporal sequence of screen captures of the rendered web page, where each screen capture defines all the content of the web page at a given time, and at least two adjacent screen captures illustrate a dynamic change of at least a portion of the content over time;
Element 12g	merge the temporal sequence screen captures with the at least one audio file to create the media stream; and
Element 12h	send the media stream to the content provider.
Claim 13	
Element 13a	The system of claim 12, further comprising: retrieve a video from the cloud based service, wherein the screen captures correspond to a plurality of static images obtained from the video.
Claim 14	
Element 14a	The system of claim 12, further comprising: select the multimedia content from the cloud based service based on a music genre associated with the broadcast media channel.
Claim 15	
Element 15a	The system of claim 12, wherein the request comprises a request for a plurality of multimedia streams for playback on a plurality of broadcast media channels.
Claim 16	
Element 16a	The system of claim 12, wherein the media stream is sent to a broadcast internet protocol (IP) address associated with the content provider.
Claim 17	
Preamble 17	A non-transitory computer-readable storage medium having stored therein instructions which, when executed by a processor, cause the processor to perform operations comprising:
Element 17a	receiving, from a content provider, a request for at least one media stream for playback on a broadcast media channel, wherein the at

Element	Claim Language
	least one media stream includes a plurality of multimedia items of different types;
Element 17b	obtaining content corresponding to the plurality of multimedia items from at least one source offering the content in at least one first format;
Element 17c	rendering a web page by a browser using the content;
Element 17d	generating a sequence of screen captures of the rendered web page, where each screen capture defines all of the content of the web page at a given time, and at least two adjacent screen captures illustrate a dynamic change of at least a portion of the content over time;
Element 17e	assembling the at least one media stream using the sequence of screen captures; and
Element 17f	providing the at least one media stream to the content provider for broadcast on the broadcast media channel.
Claim 18	
Element 18a	The non-transitory computer-readable storage medium of claim 17, wherein the obtaining comprises retrieving, for each of the plurality of multimedia items, at least one audio file corresponding to an audio component of the multimedia item and a plurality of screen captures corresponding to a video component of the multimedia item; and
Element 18b	wherein the assembling comprises combining the plurality of screen captures and the at least one audio file.
Claim 19	
Element 19a	The non-transitory computer-readable storage medium of claim 17, wherein the at least one media stream corresponds to at least one of an HTTP live stream (HLS), an HTTP playlist, and a Real-time Streaming Transport (RTSP) stream.
Claim 20	
Element 20a	The non-transitory computer-readable storage medium of claim 17, storing additional instructions which, when executed by the processor, result in operations comprising: detect a network failure affecting connectivity with the at least one website; and
Element 20b	in response, provide a previously recorded media stream to the content provider
Claim 21	
Element 21a	The non-transitory computer-readable storage medium of claim 17, wherein assembling the at least one media stream comprises

Element	Claim Language
	inserting at least one MPEG packet including metadata corresponding to the multimedia item.

I, Mr. Stuart Lipoff, declare as follows:

I. Introduction

1. My name is Mr. Stuart Lipoff. I have been retained by Stingray Group Inc. and Stingray Music USA, Inc. (collectively, “Petitioner” or “Stingray”), to provide my expert assessment and technical opinions in connection with the above captioned inter partes review (“IPR”) of U.S. Patent No. 10,123,074 (“the ’074 Patent” or “Patent-at-Issue”), Ex-1001.¹

2. I understand that the Petition for *Inter Partes Review* involves the ’074 Patent (Ex-1001) and I will provide my opinion regarding Claims 1–21 (“Challenged Claims”).

3. My opinions are based on my years of education, research, and experience, as well as my investigation and study of relevant materials. The materials that I have studied for this declaration include the documents identified in the table of exhibits.

4. I may rely upon these materials, my knowledge and experience, and/or additional materials to rebut arguments raised by the patent owner. Further, I may also consider additional documents and information in forming any

¹ All references to “Ex.” in this declaration refer to the Stingray Exhibits concurrently filed with its petition.

necessary opinions, including documents that may not yet have been provided to me.

5. This declaration is based on information currently available to me. I reserve the right to expand, modify, or supplement my opinions if I become aware of evidence or information that was not available for review at the time I drafted this declaration.

6. I am not, and never have been, an employee of any party to this IPR. I am not receiving compensation for this Declaration beyond my normal hourly fees based on my time actually spent analyzing and documenting my opinions herein on the Patent-at-Issue, the asserted prior art cited in this Declaration and in the Petition, and the issues related thereto. My compensation is not related to the outcome of this proceeding, and I will not receive any additional compensation based on the outcome of any IPR or other proceeding involving the Patent-at-Issue.

7. I have personal knowledge of the facts and opinions stated herein and, if called as a witness, could and would testify competently to them under oath.

8. Unless otherwise noted, all emphasis in any quoted material has been added.

II. Education and Work Experience

9. I have attached my resume as Appendix A to this declaration. While my resume summarizes my educational background and work history, I will now

expound upon my qualifications and professional background related to the field of multimedia processing or delivery using internet protocols.

10. I have bachelor's degrees in electrical engineering and in engineering physics, both from Lehigh University. I also have a master's degree in electrical engineering from Northeastern University, and an MBA degree from Suffolk University.

11. I was employed for 25 years by Arthur D Little, Inc. as VP and Director of Communications, Information Technology, and Electronics ("CIE"), where I was responsible for the firm's global CIE practice in laboratory-based contract engineering, product development, and technology-based consulting.

12. I was employed by Bell & Howell Communications Company for four years as a Section Manager.

13. I was employed by Motorola's Communications Division for three years as a Project Engineer.

14. At both Bell & Howell and Motorola, I had project-design responsibility for wireless communications devices with graphical user interfaces controlled by remote terminal servers.

15. I have extensive experience—over a 50-year period—working on legacy and modern applications that relate to the subject matter of the challenged patents involving processing multimedia delivery using internet protocols to

deliver content to be rendered on intelligent devices.

16. For the Multimedia Cable Network System (MCNS) consortium of the majority of USA cable TV system operators, I led the project that developed the standards and specifications for modern cable modems used to deliver IP based high speed internet services and multimedia content. These standards are known today as DOCSIS (data over cable interface specifications) and have been adopted globally as international standards. Development of DOCIS specifications involved considerations that went beyond providing best efforts residential internet web surfing to include support using MPEG convergence layers and service flows to enable quality of service delivery of delay sensitive multimedia such as video, music, and telephony services.

17. For Securus, a provider of pay per call alternate operator services to prison inmates, I evaluated their technology and assets with an emphasis on their ability to associate calling and calling party phone numbers with databases combined with their employees with multiple language skills. Following this evaluation, I worked with the client to identify and plan for offering services to clients other than prison inmates. Examples of such clients included government operated call centers, hospitals, police departments, and telephone catalog sales call centers making use of intelligent rendering engines in cellphones.

18. For International Mobile Machines (“IMM”), a firm that licenses

patents to cellphone OEMs, I developed a roadmap of future services, architectures, and technology to support alternative visions of the development of cellular. I then worked with the firm to generate R&D projects designed to increase the base of patents for IMM to license in the future. The service concepts I generated employed technologies that supported distributed software applications that have a graphical user interface.

19. For International Finance Corporation (the venture capital group of The UN's World Bank), I evaluated an investment opportunity in Cellon Inc, a PRC based cellphone design house. This project included inspection of Cellon's facilities in the PRC and France as well as detailed review of Cellon's facility assets, technology strengths, and intellectual property. Of particular focus was Cellon's technology to support enhanced services with graphic user interfaces.

20. For a consortium of cable TV system operators called Next Generation Network Services (NGNS) I led the project that developed recommendations to modify legacy cable systems architectures to support the delivery of next generation digital multimedia content to residential subscribers. The scope of this project involved enhancements to all aspects of cable system infrastructure including: backbone interconnects, head end systems, outside plant, in home distribution networks, and set-top television terminals. A particular focus was migrating set-top terminals from legacy analog to support digital video and

add interactivity.

21. For Tele2 (a pan European cellular and wireline telephone company), I supported Tele2's efforts to procure an advanced cordless telephone from contract manufacturers in China ("PRC"). This involved development of detailed technical specifications, coordination of a request for information, ("RFI"), and evaluation of the responses. The devices were all enhanced to provide non-voice services.

22. For Millicom International (a cellular provider in several developing nations), I studied capital spending and developed best practice benchmarks. The work products were then employed in forward planning and to develop strategies for improvement of their financial performance. The project involved the collection of data from over 25 systems in 12 countries and developing capital efficiency metrics that were normalized to the specific geographic and demographic specifics of each system. The project not only provided a measure of present and historical capital efficiency but also provided a management system for future deployment.

23. For the banks providing financing to The Iridium Mobile Satellite Service, I served as a technical advisor and assisted in developing the contracts between the banks and Motorola in which Motorola secured the loan. As a technical advisor, I had extensive day-to-day interactions with Motorola's

manufacturing and product design organizations. The interactions included examination of the manufacturing cost, methods, and processes of Motorola's Subscriber Products Group including voice and data applications of cellphones, pagers, and related portable wireless data communications devices.

24. For Sony USA, I supported a feasibility analysis of a planned investment by Sony into a wireless PCS carrier in the USA. This involved the development of advanced concepts employing distributed software applications that have a graphical user interface and exploring alternative business models, financial analysis, and technical analysis in order to determine financial attractiveness and risk of proceeding with the venture.

25. For Samsung Electronics Global Marketing, I developed a strategic framework for a line of portable and personal multimedia products to be introduced in the USA. The project included developing a common theme for a set of products that ranged from cellphones, MP3 music players, electronic books, PDAs, to hand-held games. One common theme was developed, product features and capabilities were detailed, and market adoption models were developed to forecast demand.

26. For Korea Mobile Telephone ("KMT"), I supported the project that developed a strategic plan to position KMT relative to Korea Telecom by enhancing their service offerings to support distributed software applications that

have a graphical user interface.

27. For Symbol Technology, a manufacturer of hand-held industrial computing products, I co-developed the protocol for a wireless local area network that was the basis for the current IEEE 802.11 wireless LAN standard. Later I worked with this same client to select voice over internet protocol (“VoIP”) codecs and algorithms that support the client’s current product offering including cordless industrial voice telephony over a quality of service (“QoS”) managed wireless IP network.

28. I helped lead the project for CableLabs that studied the technology and economics of wireless personal communications technology. This project is highlighted in the history of CableLabs in their website as one of the significant accomplishments of “The Labs.” The project included the selection of CDMA technologies and the development of strategies to compete with incumbent cellular carriers including the offering of non-voice multimedia services. This effort led to the formation of a consortium between Sprint and the cable MSOs that has evolved into the present Sprint PCS business.

29. For Cambridge Silicon Radio (UK) (“CSR”), I worked with the client to develop a prioritized list of applications for their Bluetooth component offerings. The project mapped applications into specific target customers and was based upon an analysis that considered the market needs with CSR’s capabilities, a

prioritized roadmap of products was developed to steer the R&D portfolio. A major focus of this effort was to identify Bluetooth applications for data transfer for multimedia display applications.

30. For the investors in Mitel Semiconductor (Canada), I assisted the client in valuing their telephone and business phone system telecommunications semiconductor device products and know-how in the firm. The project required a competitive review of Mitel Products and technology, and an evaluation of the future likely needs of the marketplace. The scope of the project included supporting graphics displays on the desktop phone for delivery of multimedia information such as weather and stock prices. My recommendations indicated which products should be the basis of further investment and most likely to be valued in a sale or licensing.

31. For TRW, I participated in an assignment which reviewed all their non- classified military and defense technology to identify commercial applications. A number of systems I reviewed included applications in security for wireless communications and antifraud that were developed and which became the basis for successful spin-off operations.

32. For a corporate cross-sector event organized by Motorola Corporate for all their divisions, I prepared presentations on the visions of the future in each of the major sectors in which Motorola has an interest. The presentations included:

consumer electronics, medical, automotive, industrial electronics, and communications. The presentations provided a basis for the cross-sector teams to engage in long term planning for each division.

33. For Bell South, I contributed to a major operations improvement project involving developing forecasts for the future competitive environment, customer needs, a strategy to compete, and new business models. The scope of this project included planning for videotex delivery from Bell South servers to consumer desktop videotex terminals. These forecasts were then applied to develop business redesign recommendations and a list of new service offerings.

34. I am a registered professional engineer (by examination) in The Commonwealth of Massachusetts and the State of Nevada. I also hold an FCC General Radiotelephone License and a Certificate in Data Processing from the Association of Computing Machinery (“ACM”)-supported Institute for the Certification of Computing Professionals.

35. I am a fellow of the Institute of Electrical and Electronics Engineers (“IEEE”) Consumer Electronics, Communications, Computer, Circuits, and Vehicular Technology groups. I am also a member of the IEEE Consumer Electronics Society Board of Governors (i.e., board of directors), and was the Boston Chapter Chairman of the IEEE Vehicular Technology Society. I served as President of the IEEE Consumer Electronics Society from 1996 to 1997 and as

Chairman of the Consumer Electronics Society Technical Activities and Standards Committee, as VP of Publications, and most recently at VP of Industry Activities and Standards for The IEEE Consumer Technology Society (formerly Consumer Electronics Society). I am currently the historian for The Society. I have also chaired the search committee for the Sony-supported Mazura Ibuka Award in consumer electronics.

36. In my capacity as a fellow of the IEEE Consumer Technology Society, I have chaired conference panels sessions and reviewed papers submitted for publication dealing with all manner of advanced business and consumer multimedia systems involving distributed software applications that have a graphical user interface.

37. As Vice President and Standards Group Chairman of the Association of Computer Users (“ACU”), I served as the ACU representative to the ANSI X3 Standards group. For the Federal Communications Commission’s Citizens advisory committee on CB radio (“PURAC”), I served as Chairman of the task group on user rule compliance. I have also been elected to membership in the Society of Cable Television Engineers, ACM, and the Society of Motion Picture and Television Engineers.

38. I am listed as an inventor/co-inventor on the following U.S. patents:

ID	Title	Filing Date
US-8200291-B2	Vehicle safety device for reducing driver	7/23/2008

ID	Title	Filing Date
	distractions	
US-RE44274-E	Ubiquitous imaging device based check image capture	3/14/2012
US-2005108096- A1	Portable electronic authorization system and method	10/20/2004
US-2005116026- A1	Portable electronic authorization system and method	11/12/2004
US-2012252350- A1	Vehicle safety device for reducing driver distractions	6/11/2012
US-2009212110- A1	Virtual barcodes	9/15/2008
WO-2005043438- A1	Portable electronic authorization system and method	10/20/2004
US-5692093-A	Method and apparatus for eliminating television commercial messages	1/4/1994
US-5455630-A	Method and apparatus for inserting digital data in a blanking interval of an RF modulated video signal	8/6/1993
EP-0693215-B1	Method and apparatus for eliminating television commercial messages	1/6/1994
US-4529941-A	FSK Demodulator utilizing multiple-phase reference frequencies	11/29/1982

III. Compensation

39. I am being compensated at a rate of \$375 per hour plus expenses for my expert services in connection with this proceeding. This compensation is not contingent upon my performance, the outcome of this IPR, or any issues involved in or related to this IPR.

IV. Legal Principles

40. As a technical expert, I am not offering any legal opinions. Rather, I am offering technical assessments and opinions. In rendering my analysis, I have been

informed by counsel regarding various legal standards for determining patentability. I have applied those standards in forming my technical opinions expressed in this declaration.

41. I understand that for an invention claimed in a patent to be found patentable, it must be (among other things) new and not obvious based on what was known before the invention was made.

42. I understand that the information that is used to evaluate whether an invention was new and not obvious when made is generally referred to as “prior art.”

43. I understand that, in this proceeding, Petitioners have the burden of proving that the challenged claims are invalid by a preponderance of the evidence.

44. I understand that in this *inter partes review* proceeding, the information that may be evaluated is limited to patents and printed publications. My analysis, which is set out in detail below, compares the claims to printed publications that I understand are prior art to the claims.

A. Level of Ordinary Skill in the Art

45. When interpreting a patent, I understand that it is important to identify the relevant art pertaining to the patent-in-suit as well as the level of ordinary skill in that art at the time of the claimed invention. The “art” is the field of technology to which the patent is related.

46. I have been instructed by counsel that the person of ordinary skill in the art (“POSITA”) is a hypothetical person who is presumed to know the relevant prior art. I understand that the actual inventor’s skill is not determinative of the level of ordinary skill. I further understand that the factors that may be considered in determining the level of skill include: the types of problems encountered in the art; prior art solutions to those problems; rapidity with which innovations are made; sophistication of the technology; and educational level of active workers in the field. I understand that not all such factors may be present in every case, and one or more of them may predominate.

B. Legal Standard for Claim Construction

47. I understand that the first step in determining whether a patent claim would have been anticipated or obvious is to ascertain how a POSITA would have understood the claim terms.

48. I have been instructed by counsel on the law regarding claim construction and patent claims, and I understand that a patent may include two types of claims: independent claims and dependent claims. An independent claim stands alone and includes only the limitations it recites. A dependent claim can depend from an independent claim, or it can further depend from another dependent claim. I understand that a dependent claim includes all the limitations that it recites, in addition to all the limitations recited in the claim(s) from which it

depends.

49. It is my understanding that in proceedings before the USPTO, the claims of a patent are to be construed under what is referred to as the “*Phillips* standard.” I understand that this means that claim terms of a patent are given the meaning the terms would have to a POSITA, in view of the description provided in the patent itself and the patent’s file history.

50. I understand that to determine how a person of ordinary skill would understand a claim term, one should look to those sources available that show what a person of skill in the art would have understood the disputed claim language to mean. I understand that, in construing a claim term, one looks primarily to the intrinsic patent evidence, including the words of the claims themselves, the remainder of the patent, and the patent’s prosecution history. I understand that extrinsic evidence, which is evidence external to the patent and the prosecution history, may also be useful in interpreting patent claims when the intrinsic evidence itself is insufficient.

51. I understand that words or terms should be given their ordinary and accepted meaning unless it appears that the inventors were using them to mean something else. In making this determination, the claims, the remainder of the patent, and the prosecution history are of paramount importance. Additionally, the patent and its prosecution history must be consulted to confirm whether the

patentee has acted as its own lexicographer (i.e., provided its own special meaning to any disputed terms), or intentionally disclaimed, disavowed, or surrendered any claim scope.

52. In comparing the claims of the Challenged Patent to the prior art, I have considered the Challenged Patent and its file history in light of the understanding of a person of skill at the time of the alleged invention.

C. Anticipation under 35 U.S.C. § 102

53. It is my understanding that the claims of a patent are anticipated by a prior art reference if each and every element of the claim is found either explicitly or inherently in a single prior art reference or system. I understand that inherency requires a showing that the missing descriptive matter in the claim is necessarily or implicitly present in the allegedly anticipating reference, and that it would have been so recognized by a POSITA. In addition, I understand that an enabling disclosure is a disclosure that allows a POSITA to make the invention without undue experimentation. Although anticipation typically involves the analysis of a single prior art reference, I understand that additional references may be used to show that the primary reference has enabling disclosure, to explain the meaning of a term used in the primary reference, and/or to show that a characteristic is inherent in the primary reference.

D. Obviousness under 35 U.S.C. § 103

54. It is my understanding that a claim is unpatentable if the claimed subject matter as a whole would have been obvious to a person of ordinary skill in the art at the time of the alleged invention. I also understand that an obviousness analysis takes into account the scope and content of the prior art, the differences between the claimed subject matter and the prior art, and the level of ordinary skill in the art at the time of the invention.

55. I understand that a claimed invention is not patentable if it would have been “obvious” to a person of ordinary skill in the field of the invention at the time the invention was made. This means that even if all the requirements of a claim are not found in a single prior art reference, the claim is not patentable if the differences between the subject matter in the prior art and the subject matter in the claim would have been obvious to a person of ordinary skill in the art at the time the application was filed.

56. In determining the scope and content of the prior art, it is my understanding that a reference is considered relevant prior art to the Patent-at-Issue if it falls within the field of the inventor’s endeavor. In addition, a reference is prior art if it is reasonably pertinent to the particular problem with which the inventor was involved. A reference is reasonably pertinent if it logically would have commended itself to an inventor’s attention in considering his problem. Thus, if a

reference relates to the same problem as the claimed invention, that supports the use of the reference as prior art in an obviousness analysis.

57. In my opinion, the prior art references identified herein seek to solve the same types of problems as the Patent-at-Issue and logically would have commended themselves to an inventor's attention considering the problems of the Patent-at-Issue.

58. I understand that a determination as to whether a claim would have been obvious should be based on four factors (though not necessarily in the following order): (i) the level of ordinary skill in the art at the time the application was filed; (ii) the scope and content of the prior art; (iii) the differences between the claimed invention and the prior art; and (iv) any objective factors indicating obviousness or non-obviousness that may exist in a particular case.

59. It is my understanding that an obviousness analysis cannot be based on hindsight, but it must be done using the perspective of a person of ordinary skill in the relevant art as of the effective filing date of the patent claim.

60. I understand the objective factors indicating obviousness or non-obviousness may include: commercial success of products covered by the patent claims; a long-felt but unaddressed need for the invention; failed attempts by others to make the invention; copying of the invention by others in the field; expressions of surprise by experts and those skilled in the art at the making of the

invention; and the patentee having proceeded contrary to the accepted wisdom of the prior art. I also understand that any of this evidence must be specifically connected to the invention rather than associated with the prior art or with marketing or other efforts to promote an invention.

61. I am not aware of such objective indicia of non-obviousness in this case. However, I reserve the right to address them should any be identified or relied upon.

62. I understand that the teachings of two or more prior art references may be combined in the manner disclosed in the claim if such a combination would have been obvious to one having ordinary skill in the art at the effective filing date. In determining whether a combination would have been obvious, I understand that the following exemplary rationales may support a conclusion of obviousness:

- Combining prior art elements according to known methods to yield predictable results;
- Simple substitution of one known element for another to obtain predictable results;
- Use of a known technique to improve similar devices (methods, or products) in the same way;
- Applying a known technique to a known device (method, or product) ready for improvement to yield predictable results;
- “Obvious to try”—choosing from a finite number of identified, predictable solutions, with a reasonable expectation of success;
- Known work in one field of endeavor may prompt variations of it for use in either the same field or a different one based on design incentives or other market forces if the variations are predictable to a person of ordinary skill in the art; and
- Some teaching, suggestion, or motivation in the prior art that would

have led a person of ordinary skill to modify the prior art reference or to combine prior art reference teachings to arrive at the claimed invention.

63. I understand that the obviousness analysis need not seek out precise teachings directed to the specific subject matter of the challenged claim, but instead can take account of the ordinary innovation and experimentation in the relevant field that does no more than yield predictable results.

64. I understand that, in assessing whether there was an apparent reason to modify or combine known elements as claimed, it may be necessary to look to interrelated teachings of multiple patents or prior art references, the effects of commercial demands, and the background knowledge of a person of ordinary skill in the art. I further understand that any motivation that would have applied to a person of ordinary skill in the art, including motivation from common sense or derived from the problem to be solved, is sufficient to explain why references would have been combined.

65. I understand that a person of ordinary skill in the art is also a person of ordinary creativity. In many fields, it may be that there is little discussion of obvious techniques, modifications, and combinations, and it may be the case that market demand will drive a new design, rather than scientific research or literature. When there is market pressure or design need to solve a particular problem, and there are a finite number of identified, predictable solutions, a person of ordinary

skill has a good reason to employ the known options. If this leads to the expected success, then it is likely the product of ordinary skill and common sense as opposed to patentable innovation. I understand that if a combination was obvious to try, that may show that it was obvious and therefore unpatentable. That a particular combination of prior art elements was obvious to try suggests that the combination was obvious even if no one made the combination.

E. Priority Date

66. I have been asked to assume that the priority date of the Patent-at-Issue is December 22, 2014. *See* Ex-1001 at (60).

V. Level of Ordinary Skill

67. Assuming that the priority date of the Patent-at-Issue is December 22, 2014, based on my knowledge and skills, I was as POSITA as of December 22, 2014, and can provide opinions regarding the knowledge of POSITA as of that time. My opinions herein are, where appropriate, based on my understanding of the perspective of a POSITA at that time.

68. Based on the materials and information I have reviewed and based on my experience in the technical areas relevant to the Patent-at-Issue, a person of ordinary skill in the art at the time of the alleged invention of the Patent-at-Issue would have a bachelor's or equivalent degree in computer science or a related field and at least 2 year's of experience in multimedia processing or delivery using

internet protocols. A person with less formal education but more experience, or more formal education but less experience, could have also met the relevant standard for a POSITA.

VI. Overview of the '074 Patent

A. Summary of the Patent

69. The '074 Patent has 21 claims. Claims 1, 12, and 17 are independent claims.

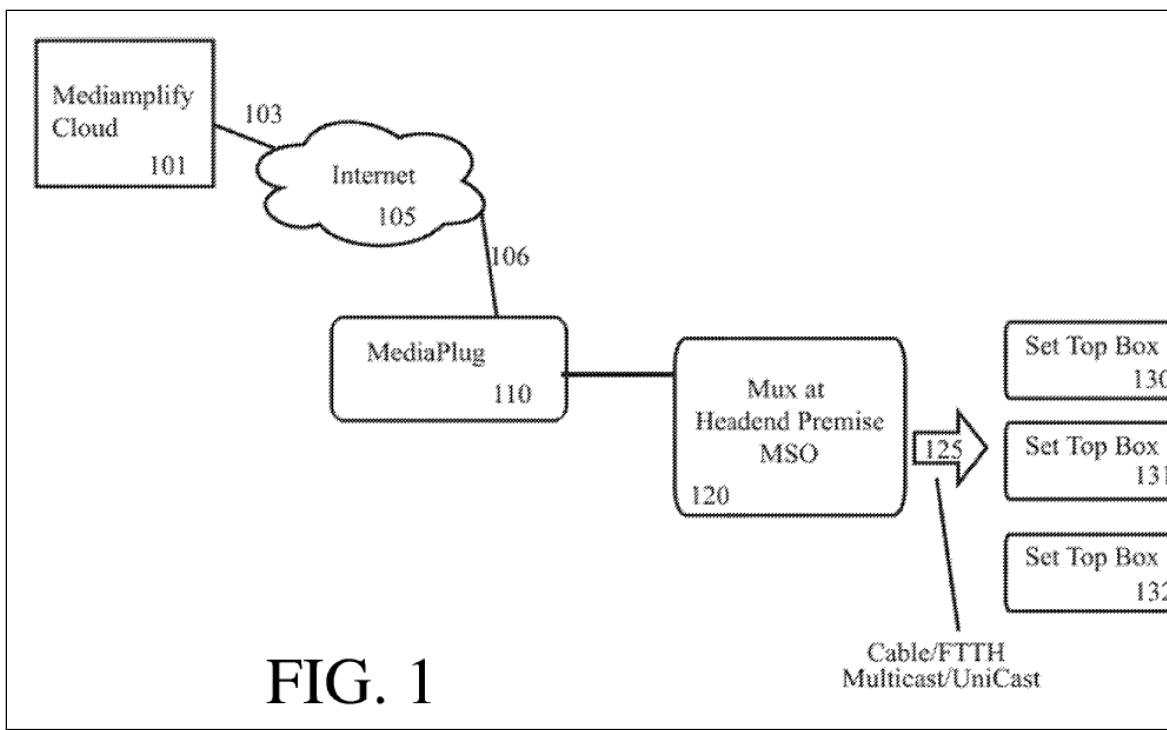
70. The '074 Patent is generally directed to “a mechanism for delivering multimedia content from a cloud-based system to cable or satellite content providers.” Ex-1001, 1:16-18.

71. At a high level, the '074 Patent describes:

An example computer-implemented method can receive, from a content provider such as a cable or satellite operator, a request for at least one media stream for playback on a broadcast media channel. The request for the at least one media stream can include a request for a plurality of multimedia items. Content corresponding to the plurality of multimedia items can be obtained from at least one website or cloud service that offers the content in at least one first format. Based on the obtained content, the plurality of multimedia files can be generated in a second format that is compatible with the content provider. The media stream can [be] assembled using each of the multimedia items generated in the second format. The media stream can be provided to the content provider for broadcast on the broadcast media channel.

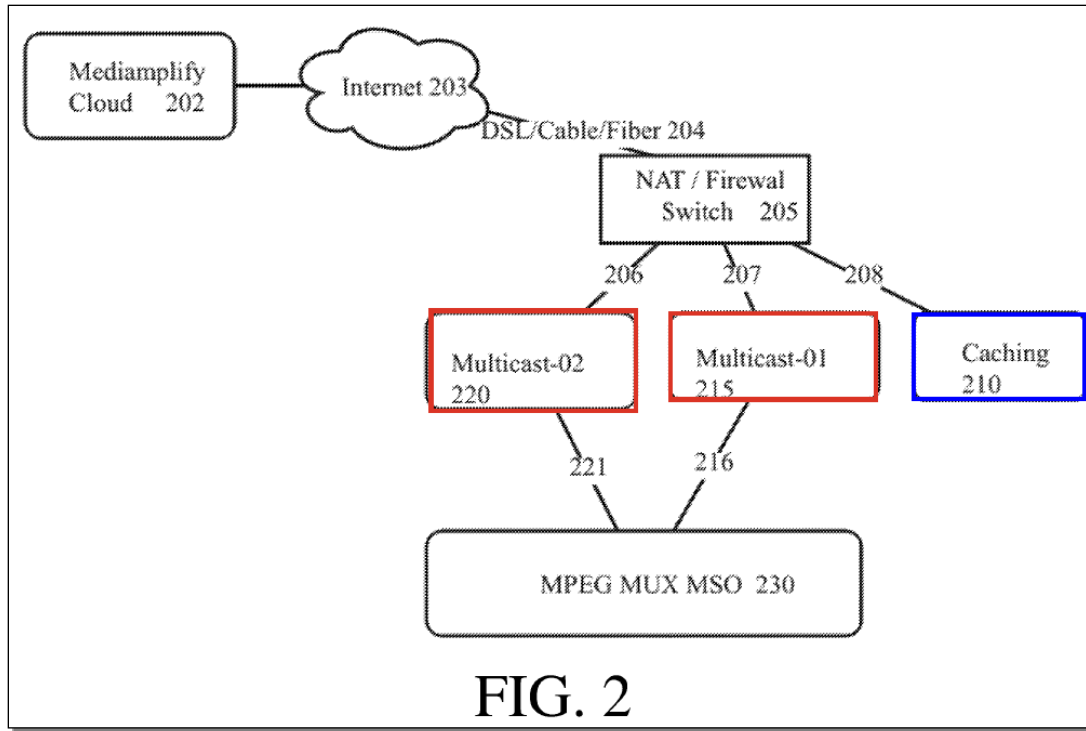
Ex-1001, 2:50-64.

72. Figure 1 of the '074 Patent is reproduced below.



73. As shown in Figure 1, the Patent-at-Issue discloses a Mediaplug 110 unit that is in communication with the cloud 101 through the internet 105. Ex-1001, 3:61-4:17. The Mediaplug 110 can reside at an “MSO” facility “used by a cable operator to receive all TV and Radio programming that the cable operator will then multiplex, re-encode, and distribute from the MSP to a set of subscriber units with set top boxes....” *Id.*, 4:17-22. The Mediaplug 110 provides multimedia content (e.g., video and audio) to an MPEG multiplexer which delivers content to subscriber set top boxes 130, 131, 132 via coaxial cable 125. *Id.*, 4:22-35.

74. Figure 2 of the Patent-at-Issue is reproduced below (coloring has been added).



75. As shown in Figure 2, the hardware components of the Mediaplug 110 includes three servers. Ex-1001, 4:47-49. Specifically, the Mediaplug 110 includes a caching unit 210 (blue) which is the storage component of the system and can contain the multimedia files in the format required by the cable operators. *Id.*, 4:64-67. The caching unit can encode and transcode the multimedia files it downloads from the cloud and communicates with the two multicast units 215, 220 (red) allowing the multicast units 215, 220 to pull or obtain information from it. *Id.*, 5:1-7.

B. Prosecution History of the Patent

76. During prosecution of the Patent-at-Issue, the Examiner rejected the original independent claims as anticipated by the cited prior art. Ex-1011, 74-92.

In response, the Patent Owner amended the claims to require: (1) “render[ing] a web page by a browser using the content,” and (2) “generat[ing] a temporal sequence of screen captures of the rendered webpage, where each screen capture defines all the content of the web page at a given time, and at least two adjacent screen captures illustrate a dynamic change of at least a portion of the content over time.” Ex-1011, 62. Based on the Patent Owner’s amendment and his representation that this addition was “an important distinction” over the cited prior art (Ex-1011, 69), the Examiner allowed the claims of the ’074 Patent without further rejection. Ex-1011, 21-23.

77. With respect to the added “rendering” language, the ’074 Patent explains that a web service “can include JavaScript, CSS, and HTML content files that can be rendered using a browser using WebKit (e.g. PhantomJS or Safari) or any other browser-rendering engine compatible with HTML4/5 or any future HTML version.” Ex-1001 at 6:67-7:4.

78. With respect to the added “screen capture” language, the ’074 Patent states that “rendered images from a web service can be used to create overlapping video or replace any video in the video feed file.” Ex-1001 at 7:5-7. Specifically, “one or more screens will be retrieved from the rendering engine” and captured “using a tool similar to PhantomJS (Webkit-based headless engine for rendering images) or QtCapture, or simply capturing screen frame buffers from a machine

running any software tool.” Ex-1001 at 7:14-21.

79. PhantomJS is a headless web browser that was first released on or about 2011. Similarly, QtCapture is a tool that has been around since at least 2011 and is used to capture media (e.g., video, images, or screen recordings). Accordingly, both were commonly-known and readily-available third-party software tools. In fact, the Patent-at-Issue acknowledges the availability of these tools to POSITAs. Ex-1001, 7:14-21.

80. The specification further provides that “[o]nce all screens and video are captured, 530 the resulting output created can be a video file that then is either replaced or merged (multiplexed) with the original file.” *Id.*, 7:24-27. “The multiplexing can be done using tools such as FFMPEG or VLC or any proprietary tool that can multiplex audio and video files into a resulting MPEG Transport Stream (or MPEG-4 output, or any similar output).” *Id.*, 7:39-45; *see also* 7:32-36.

81. FFMPEG is an open-source software that has been around since on or about 2000 and allows users to process multimedia files including audio and video. Similarly, VLC was released on or about 2001 and is another open source media player available to play digital media including audio and video. Accordingly, both FFMPEG and VLC were well-known tools that were readily available to POSITAs.

82. Similarly, MPEG and its features were well known to POSITAs.

MPEG refers to the “Moving Picture Experts Group” which is a family of international standards used for coding audio-visual information in a digital compressed format. MPEG standards compress video into a series of video frames, such as I-frames, P-frames and B-frames, that can be decoded to reproduce the encoded video. Similarly, the MPEG Transport Stream or MPEG-TS format is a digital container format for transmitting video, audio and metadata, and is commonly used in broadcast systems. Both MPEG and the MPEG Transport Stream output format were commonly known to POSITAs and widely used in multimedia delivery prior to the filing date of the '074 Patent.

83. As a result, the Challenged Claims are all directed to the combined use of commonly-known processes, software tools and transport formats that pre-existed the '074 Patent's priority date.

VII. Overview of the Prior Art

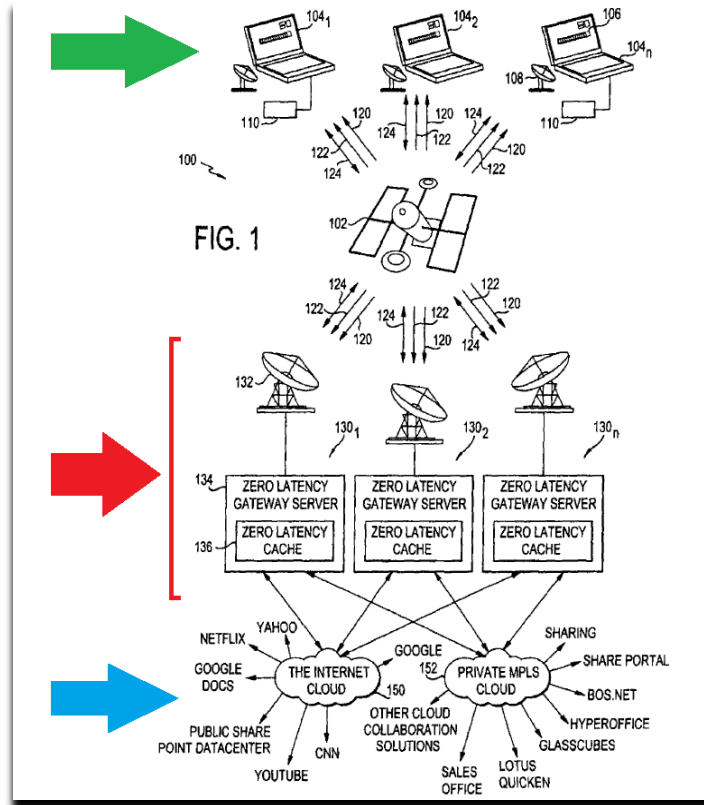
A. Avellan

84. Avellan is U.S. Patent No. 8,954,600 to Avellan, et al., which was filed on March 2, 2012 and issued on February 10, 2015. It is my understanding that Avellan is prior art to the Patent-at-Issue.

85. Avellan is directed to a communication system that can “broadcast information from a web server over a broadcast device to a multitude of user computers.” Ex-1003, 2:9-10. Specifically, “system 100 provides for the user

computers 104₁-104_n to access the Internet 150 and/or private network cloud 152 through a virtual browser 106 of the gateway 130.” Ex-1003, 4:18-21. “[T]he browser software 106 resides at the gateway 134, and is configured to run as a virtual browser as a remote client of the gateway server 134.” Ex-1003, 4:56-58. Because the browser software resides at the gateway, “the remote browser 106 may rely upon the computing power and very high-speed connection of the gateway server 134 to resolve and render pages, images, and documents from the networks 150, 152.” Ex-1003, 4:62-65.

86. Referring to Avellan’s Figure 1 (below), a user at computer 104 (green arrow) can request media streams from either the Internet or a private network cloud (collectively, blue arrow) for playback. That gateway platform 130 (red arrow) receives the request, obtains the content from the networks, processes it using the disclosed browser software, and then broadcasts the requested media on a broadcast media channel.



Ex-1003, Fig. 1.

87. Avellan further discloses that “web pages often have information which is rendered over a period of time, such as a video, streaming information, or an animated display. Accordingly, the gateway server 134 continuously captures images of the web page until it detects a repeating pattern of the information in the web page.” Ex-1003, 5:5-5:10. “Thus, gateway server 134 will be certain to capture all the information on the web page even if that information continues over a period of time.” Ex-1003, 5:10-5:12. Avellan explicitly adds that “suitable sites for the broadcast mode are news sites like CNN, BBC, newspaper, live streaming television feeds, movies, music downloads, or ESPN.” Ex-1003, 8:18-21.

88. Avellan is in the same field of endeavor as the Patent-at-Issue.

B. Durante

89. Durante is U.S. Patent No. 8,819,043 to Durante, et al. (“Durante”), which was filed on November 9, 2010. It is my understanding that Durante is prior art to the Patent-at-Issue.

90. Durante is in the same field of endeavor as the Patent-at-Issue.

91. Durante generally relates to the playback of music videos and discloses the use of metadata for the song title and artist name.

C. Ma

92. Ma is U.S. Patent No. 9,635,075 to Ma, et al. (“Ma”), which was filed on March 8, 2010. It is my understanding that Ma is prior art to the Patent-at-Issue.

93. Ma is in the same field of endeavor as the Patent-at-Issue.

94. Ma generally relates to the broadcast of media services and the use of identifiers to identify channel content.

D. Suzuki

95. Suzuki is U.S. Patent No. 6,463,445 to Suzuki, et al. (“Suzuki”), which was filed on September 30, 1999. It is my understanding that Suzuki is prior art to the Patent-at-Issue.

96. Suzuki is in the same field of endeavor as the Patent-at-Issue.

97. Suzuki generally relates to a multimedia retrieval system that includes

a process for obtaining information relating to an encoding format that is compatible with the decoding capabilities of a client device.

E. Wannamaker

98. Wannamaker is U.S. Patent Application Publication No. 2004/0031052 to Wannamaker, et al. (“Wannamaker”), which was published on February 12, 2004. It is my understanding that Wannamaker is prior art to the Patent-at-Issue.

99. Wannamaker is in the same field of endeavor as the Patent-at-Issue.

100. Wannamaker generally relates to obtaining web content, rendering it using browser software executing on the server, and imaging the rendered content for encoding into an MPEG video stream for delivery to a client.

F. Heikens

101. Heikens is U.S. Patent No. 7,778,279 to Heikens, et al. (“Heikens”), which was filed on June 5, 2007. It is my understanding that Heikens is prior art to the Patent-at-Issue.

102. Heikens is in the same field of endeavor as the Patent-at-Issue.

103. Heikens generally relates to a video server for supplying video channels to subscribers that allows for instant channel change.

G. Matthews

104. Matthews is U.S. Patent No. 9,264,750 to Matthews, et al.

(“Matthews”), which was filed on December 23, 2010. It is my understanding that Matthews is prior art to the Patent-at-Issue.

105. Matthews is in the same field of endeavor as the Patent-at-Issue.

106. Matthews generally relates to playback of video streams on user devices and insertion of advertising into video streams.

H. Wilsher

107. Wilsher is U.S. Patent No. 9,240,966 to Wilsher, et al. (“Wilsher”), which was filed on May 8, 2014. It is my understanding that Wilsher is prior art to the Patent-at-Issue.

108. Wilsher is in the same field of endeavor as the Patent-at-Issue.

109. Wilsher generally relates to playback of video streams on user devices and insertion of advertising into video streams.

VIII. Grounds of Invalidity

A. Ground 1: Claims 1-6, 8, 9, 12-15, 17, 18 and 20 are anticipated by Avellan

110. Based on the citations in the Petition and the accompanying explanations, it is my opinion that Avellan anticipates Claims 1-6, 8, 9, 12-15, 17, 18 and 20.

111. With respect to Element 1d, a POSITA would understand the plain and ordinary meaning of Element 1d and the phrase “at least two adjacent screen

captures illustrate a dynamic change of at least a portion of the content over time” based on the context of the ’074 Patent to reflect that the rendered web page of Element 1c includes video, animations, or similarly moving content—*i.e.*, not just static content like a picture or text—and that movement is in effect recreated by the capturing of a sequence of screen captures of that content. Accordingly, by continuously capturing screen images of information that is rendered over time—such as “video, streaming information, or an animated display”—two adjacent screen captures from Avellan will illustrate a dynamic change of at least a portion of that content over time. For example, if a streaming hockey game is being rendered, a screen capture at Time 1 followed by a screen capture at Time 2 will illustrate a dynamic change in that game, such as the movement of players on the ice between Time 1 and Time 2—*i.e.*, a dynamic change of at least a portion of the content over time.

112. With respect to Element 3a, a POSITA would recognize that Avellan’s disclosure that its system can suitably be used for applications like “live streaming television feeds” and “movies” would inherently disclose the combination of the generated video frames with an audio file. A POSITA readily understands that reference to television and movies would include an audio-video program. I note that Avellan mentions, as an example, that it can be used to generate channels such as theme-specific music channels (such as country music),

which a POSITA would also understand inherently involves the inclusion of audio data with the generated video frames.

113. With respect to Element 5a, a POSITA would understand that a music channel “such as country music” in Avellan would include metadata corresponding at least to either the song title, the country music artist, or the music genre. For example, in order to generate a theme-specific channel, such as “country music” there would be associated metadata identifying a given audio file as belonging to the category of country music and identifying the resulting video stream as pertaining to that genre.

114. With respect to Element 6a, a POSITA would understand that each broadcast media channel in Avellan has an associated channel identifier that allows the user to tune to the desired channel, such as CNN or ESPN. Avellan’s disclosure of outputting a “number of channels” in a video frame format that a user can “tune” to would inherently require some identifier that the client device could use to select between the various channels according to the user’s choice.

115. With respect to Elements 12a and 12b, a POSITA would recognize that Avellan’s disclosure that the gateway can be implemented on a server or computer or other “processing devices” inherently discloses at least one processor.

116. With respect to Elements 20a and 20b, a POSITA would understand the reference to “redundancy” in Avellan to mean, for example, gateway platform

130₂ can substitute for gateway platform 130₁ when system 100 detects a failure at gateway platform 130₁ that impacts communication between the user and the content networks—*i.e.*, affects connectivity with a website. A POSITA would further recognize that the purpose of redundancy is to allow continuation of service in the event of a server failure or a communications failure impacting the client's ability to obtain content from an upstream source and that the redundant gateway platform would by necessity have previously recorded the media stream in order to provide this redundancy.

B. Ground 2: Claim 5 is obvious in view of Avellan and Durante

117. Durante discloses that “music videos are maintained in video library 114, and can be stored in a variety of different formats, such as MP4 (MPEG-4) files.” Ex-1004 at 4:19-21. Durante states that “metadata associated with a music video can include a title of the song in the music video [and] the name of an artist that recorded the song in the music video.” Ex-1004 at 4:46-48.

118. It would have been obvious for a POSITA to combine Durante's song title and artist metadata with Avellan's music genre broadcast channels, see Ex-1003 at 8:25-27 (describing broadcast channels having a specific theme, such as “country music”) because a POSITA would have been motivated to add Durante's descriptive information so that viewers could identify the specific song and name of the artist. And POSITAs would have had a reasonable expectation of success in

such a combination because Avellan's system delivers its channels in a "video frame format"—such as the commonly used MPEG format—and the MPEG standard includes provisions for the inclusion of metadata, such as the song and artist information disclosed in Durante. Indeed, the '074 Patent does not purport to have invented a novel encoding technique that permitted the inclusion of such information, and instead discloses that such data can be "packaged in an MPEG Packet that is part of the MPEG Transport Stream." Ex-1001 at 4:41-44.

119. As a result, it is my opinion that Avellan in view of Durante renders Claim 5 obvious.

C. Ground 3: Claim 6 is obvious in view of Avellan and Ma

120. Ma teaches that "a user can assign different channel identifiers to various web sites, for example, a first web site (such as "THOMSON.NET") can be assigned channel identifier 101, a second web site (such as "YAHOO.COM") can be assigned to channel identifier 102, and a third web site (such as "GAMEFAQS.COM") can be assigned to a third channel identifier 103." Ex-1005 at 5:5-11. As a result, "channels 1-100 would provide media services associated with broadcasted television channels, while channel 102 brings up a representation of the content on the homepage YAHOO.COM." Ex-1005 at 5:13-16.

121. It would have been obvious for a POSITA to combine the channel identifier of Ma with Avellan's system, which discloses that "[t]he user can then

tune the browser 106 to one of the broadcast channels to receive that content.” Ex-1003 at 8:27-29. A POSITA would have been motivated to combine Avellan’s disclosure of tuning to broadcast channel with Ma’s teachings of channel identifiers so that a user could select between channels based upon identifiers.

122. A POSITA would have had a reasonable expectation of success in combining Avellan with Ma because Avellan’s system describes being able to obtain content from websites, such as CNN, ESPN, YouTube or from web services like Netflix. Ex-1003 at Fig. 1. Similarly, Ma teaches assigning “different channel identifiers to various web sites,” such as Yahoo.com. Ex-1005 at 5:5-11. A POSITA would have recognized that assigning Ma’s alphanumeric channel identifier to Avellan’s channels—for example, a request for the “ESPN” channel would be implemented in the same manner as a request for channel “008”, where “008” is assigned to ESPN—was a trivial task and would not have required alteration of the system in Avellan. Indeed, the ’074 Patent does not purport to have invented a novel identification technique, and instead discloses that such identifiers can simply be “an integer value from 1 to the maximum number of channels.” Ex-1001 at 6:47-49.

123. As a result, it is my opinion that Avellan in view of Ma renders Claim 6 obvious.

D. Ground 4: Claim 7 is obvious in view of Avellan and Suzuki

124. Avellan teaches “[o]nce the page is imaged (including any audio on the web page), the gateway server 134 compresses the image or *video frame format* and sends it to the browser 106 via the satellite 102.” Ex-1003 at 5:12-5:15 (emphasis added). Avellan does not specifically disclose that the “video frame format” can be MPEG. However, Suzuki discloses “an automatic format conversion process [that] *queries information from the client system* (requester) and also receives the data structure identifying the encoding format. The *client information identifies the decoding format* compatible with the client.” Ex-1006 at 3:44-49 (emphasis added). Suzuki further discloses that the data “can be formatted under any number of the well known formatting standards *such as, for example, MPEG*, JPEG, H.263, H.261, Motion JPEG, Video CD, DVD, DV (Digital Video), Digital Still Camera, etc.” Ex-1006 at 6:37-40 (emphasis added).

125. A POSITA would have been motivated to combine Avellan with Suzuki because it is advantageous to query the downstream content provider to determine what output “video frame format” was able to be decompressed and displayed at the user devices—*i.e.*, to determine what format was “suitable” for a given device. And a POSITA would have had a reasonable expectation of success, given that, as discussed above, Avellan converts web content into a compressed “video frame format” that is “suitable for broadcasting to a large number of user

computers” and “any suitable format(s)” can be used. Ex-1003 at 5:12-32, 8:52-53. In the same manner, the ’074 Patent describes “a second format” as “a format that is suitable for the cable operator.” Ex-1001 at 8:3-8. Avellan also states that the user computers 104 “can be any suitable device . . . such as a laptop computer, desktop computer, smartphone, tablet PC, laptop, and Internet equipped television.” Ex-1003 at 3:53-56. As a result, it would have been obvious to include Suzuki’s query-answer exchange to determine decoding capabilities prior to generating the video frames for delivery, and such use would not have required any alteration of the system of Avellan.

126. Moreover, POSITAs would have understood that Avellan’s process of generating a sequence of screen captures for compression into a “video frame format” is compatible with the MPEG format, which compresses video data into a sequence of video frames for decoding. As a result, use of MPEG as the “second format” would have been obvious and not required any alteration of the system of Avellan. Similarly, prior to the ’074 Patent, the MPEG format was commonly used to encode video, and the MPEG codec was commonly found in a range of user devices, including laptops, desktops, smartphones, tablets, and Internet-equipped televisions.

127. Indeed, the ’074 Patent does not provide any disclosure in its specification of how this “querying” process is performed or otherwise purport to

have invented a novel way of querying the content provider to determine the second format for encoding the media stream. Ex-1001. As a result, Applicant recognized that such a process was already commonly-known in the art and could be readily-implemented by a POSITA.

128. As a result, it is my opinion that Avellan in view of Suzuki renders Claim 7 obvious.

E. Ground 5: Claims 10, 11 and 21 are obvious in view of Avellan and Wannamaker

129. Wannamaker states that “[a] multimedia streamer (MMS) consists of the audio/video/terminal server (AVTS) that delivers the units of audiovisual information sent by the system to the user’s set-top box.” Ex-1007 at [0193]. “The AVTS is responsible for delivering MPEG video and Dolby AC-3 audio streams to the set-top box. A special MPEG multiplexer (MUX) card, controlled by the AVTS, streams data onto the cable network.” Ex-1007 at [0195].

130. Similarly, Avellan teaches providing a media stream to a content provider, and POSITAs would have understood that an MPEG transport stream is readily capable of transporting both MPEG video data and encoded audio data, such as AC-3 audio data. POSITAs also would have understood that an MPEG multiplexer is an obvious way of combining MPEG video data and encoded audio data for delivery.

131. Thus, it would have been obvious to combine Wannamaker’s

disclosure of an MPEG multiplexor card with Avellan's system for caching and delivering music channels, live streaming television, and movies—all of which include audio and video data—because MPEG multiplexing was a commonly-known and available way to combine and delivery such content. A POSITA would have further been motivated to use such a MPEG multiplexor card because it is an easy and reliable way of sending a transport stream combining related audio and video data—which would need to be received at relatively the same time in order to be played back in sync—as compared to sending such streams separately downstream.

132. Moreover, POSITAs would have had a reasonable expectation of success in combining Avellan's broadcast system with Wannamaker's MPEG multiplexor associated with the content provider, because such a combination would not have required any alteration to the system of Avellan, which as discussed above, already discloses the use of a video frame format, like MPEG, that includes encoded audio. Indeed, the '074 Patent does not purport to have invented the MPEG multiplexor and specifically notes that such multiplexors—like the “Arris TMX-2010”—were readily and publicly-available prior to the '074 Patent.

133. As a result, it is my opinion that Avellan in view of Wannamaker renders Claim 10 obvious.

134. Wannamaker discloses that its system is implemented as a “virtual machine (VM)” that is “compatible with the JVM defined in the Java Virtual Machine Specification.” Ex-1007 at [0354]. For example, Wannamaker states that “[t]he microbrowser 194 (Fig. 9) is an LMAE application,” and that “[t]he microVM application environment (LMAE) 50, [] is a Java compatible virtual machine.” Ex-1007 at [0489] and [0108]. Under Wannamaker’s “microbrowser rendering” process, a server “continuously transmits the Web data to the client in an MPEG video stream” and “puts images of the rendered Web page in MPEG I-frames and MPEG P-frames.” Ex-1007 at [0271] and [0098] (stating that “content is fetched from Web sites, converted or rendered by the system, and then cached on application server”).

135. It would have been obvious for a POSITA to combine Avellan’s “network of servers, mainframe computer(s) or other high speed and high capacity processing devices,” Ex-1003 at 4:26-29, that “may be positioned at a strategic Internet Exchange Point (IXP),” Ex-1003 at 4:29-31, to use Wannamaker’s virtual machines. POSITAs would have recognized that Avellan’s server farm or a server located at an IXP would not require alteration to run on Wannamaker’s virtual machines.

136. A POSITA would have been motivated to use such a virtual machine because it was understood that virtual machines were an efficient and effective

way to implement a system like Avellan. Virtual Machines were known to be a flexible and scalable solution for content delivery and could reduce hardware costs. Similarly, a POSITA would have been motivated to combine Avellan with the teachings of Wannamaker because of the overlap in both systems. Both Avellan and Wannamaker are directed to server-side software that obtains web-based content, renders it using a browser, and then packages it for delivery in a video frame format. And because of this similarity, POSITAs would have had a reasonable expectation of success in combining Avellan's system with Wannamaker's disclosure of virtual machines. Indeed, the '074 Patent does not purport to have invented a novel way of implementing a virtual machine or purport to have invented a new virtualization environment, and instead simply discloses that a virtual machine can be implemented through known products, like "VMWare or Xen." Ex-1001 at 12:8-12.

137. As a result, it is my opinion that Avellan in view of Wannamaker renders Claim 11 obvious.

138. Wannamaker discloses "an information platform [that] converts Internet content and protocols into forms suitable for TV viewing. The content is fetched from Web sites, converted or rendered by the system, and then cached on application server" for delivery to a client in an MPEG transport stream. Ex-1007 at [0098]. Wannamaker discloses that this MPEG stream "contain[s] MPEG video,

MPEG audio, and data via a specialized hardware multiplexer card.” Ex-1007 at [0117]. Specifically, with respect to the “data” component, Wannamaker teaches that “the server transmits some *additional information about the Web page’s characteristics in an MPEG data stream.*” Ex-1007 at [0271] (emphasis added) (stating that the information is “contained in an MML tile”). A POSITA would understand that an “MML” tile is an MPEG packet containing MPEG markup language that corresponds to the multimedia item. For example, the data may include “foreground text” or “hyperlink URLs.” Ex-1007 at [0271] and [273] (stating that the “MML lets the user navigate hypertext links”).

139. Similarly, Avellan discloses a “tag file [] which maps the various locations of the action points on the web page,” Ex-1003 at 5:42-43 and 2:62 (stating that “action points” include “selectable links, text boxes, etc.”). This allows the user to “retain[] all the functionality of the website.” Ex-1003 at 5:47-52.

140. Thus, a POSITA would have been motivated to use Wannamaker’s MPEG data packet to transmit Avellan’s tag file as part of the output “video frame format.” The MPEG standard is not only a “video frame format” but it includes provisions for delivery of data frames that include metadata. Combining Avellan’s system and tag files with Wannamaker’s MPEG data packet would simplify the delivery of metadata mapping action points like hypertext links and/or metadata for

text boxes and foreground text.

141. It would have been obvious for a POSITA to combine Wannamaker's disclosure of MPEG metadata above with the system of Avellan. A POSITA would have had a reasonable expectation of success combining Wannamaker's disclosure of MPEG metadata packets above with the system of Avellan because Wannamaker uses the MPEG packets to transmit similar metadata—*i.e.*, foreground text and hypertext links—as the tag files disclosed in Avellan. [Similarly, Avellan states that “[t]he tag file is preferably transmitted to the user computer 104 *with the compressed video data.*” Ex-1003 at 13:55-57. As a result, POSITAs would have understood that this information could be included in an MPEG metadata packet that is transmitted with the MPEG video data, as disclosed in Wannamaker, without requiring altering the operation of Avellan.

142. Indeed, the '074 Patent does not purport to have invented a novel encoding technique that permitted the inclusion of such information, and instead simply discloses that such metadata can be “packaged in an MPEG Packet that is part of the MPEG Transport Stream.” Ex-1001 at 4:41-44.

143. As a result, it is my opinion that Avellan in view of Wannamaker renders Claim 21 obvious.

F. Ground 6: Claim 16 is obvious in view of Avellan and Heikens

144. Heikens discloses “a video server for supplying video channels to

subscribers” and states that “an example of a common multimedia stream is a broadcast stream bound to a broadcast address, being a network broadcast address such as the broadcast IP address 255.255.255.255, or a broadcast hardware address such as the broadcast MAC address FF:FF:FF:FF:FF:FF:FF:FF.” Ex-1008 at 1:15-16 and 1:25-29.

145. It would have been obvious for a POSITA to combine Heiken’s disclosure of a broadcast IP address with the system of Avellan. Avellan discloses that its system can be used with “any wired or wireless medium which facilitates broadcasting” information and specifically mentions that connections can include WiFi and Wi-Max, which are commonly recognized as wireless network protocols that use Internet Protocols to communicate. Ex-1003 at 4:39-41 and 3:48-52.

146. Similarly, Avellan states that the user computers 104 “can be any suitable device . . . such as a laptop computer, desktop computer, smartphone, tablet PC, laptop, and Internet equipped television,” which a POSITA would recognize would all be capable of communicating using Internet Protocols. Ex-1003 at 3:53-56. POSITAs would have been motivated to combine the broadcast system of Avellan with Heikens’ disclosure of using a broadcast IP address because use of broadcast IP addresses was “common” and was an easily-implemented solution for broadcasting content over a network to downstream user devices that are already capable of communicating using Internet Protocols, such

as computers, laptops, and Internet-equipped televisions.

147. A POSITA also would have had a reasonable expectation of success because use of a broadcast internet protocol (IP) address associated with the content provider to broadcast channels to IP-equipped devices, such as computers and “Internet equipped televisions” was commonly-known and commonly-used prior to the ’074 Patent, is compatible with the system of Avellan, and would not require altering that system, which Avellan states can be used with “any wired or wireless medium which facilitates broadcasting” information. Ex-1003 at 4:39-41 and 3:48-52. Indeed, the ’074 Patent does not purport to have invented the use of broadcast IP addresses.

148. As a result, it is my opinion that Avellan in view of Heikens renders Claim 16 obvious.

G. Ground 7: Claim 19 is obvious in view of Avellan and Matthews

149. Matthews teaches that “video content may be delivered over content delivery network 110 using a packet streaming protocol, *such as the known HTTP Live streaming protocol.*” Ex-1009 at 5:29-32 (emphasis added).

150. It would have been obvious for a POSITA to combine Matthews’ disclosure of the HTTP live streaming protocol (HLS) with the system of Avellan, including for example its “live streaming television feeds” and “live broadcasting.” Ex-1003 at 8:18-21 and 12:37. A POSITA would have been motivated to do so

because the HLS protocol is a well-known protocol that provides advantages for streaming live content, including supporting adaptive bit rate streaming which can adjust the video quality based on bandwidth and device capabilities without interrupting the stream. Similarly, another advantage is that HLS is supported by nearly all Internet-equipped devices that use HTTP, which makes it simple to implement.

151. A POSITA would have had a reasonable expectation of success to combine the system of Avellan with Matthew's use of the HLS protocol because HLS can be implemented on a server that uses HTTP. In that regard, Avellan states that "HTTP is used to serve images, sound, and other content, in addition to HTML" and states that the system "can store the data in any suitable format(s) including HTTP format." Ex-1003 at 1:25-26 and 8:52-53. Additionally, HLS uses H.264 or MPEG-4 Part 10 to encode video data, and H.264 is a video frame format that is compatible with Avellan's disclosure that its system outputs a "video frame format." Thus, a POSITA would recognize that use of HTTP Live Streaming would not require altering the system of Avellan. Instead, a POSITA would need only have applied a commonly-known and commonly-used transmission protocol that was tailored for the delivery of live content in order to deliver Avellan's live streaming television broadcasts to users. Indeed, the '074 Patent does not purport to have invented the HTTP Live Streaming protocol and

simply states that “a HTTP Live Streaming (HLS) generation program will produce the files and segment them as needed by the encoder and can then be serviced by the HTTP server.” Ex-1001 at 8:52-55.

152. As a result, it is my opinion that Avellan in view of Matthews renders Claim 19 obvious.

H. Ground 8: Claim 20 is obvious in view of Avellan and Wilsher

153. Wilsher teaches delivering web content, including “videos” and “audio files,” obtained through a content URI, which—like in the system of Avellan—is rendered “in a manner substantially similar to the browser rendering of a webpage.” Ex-1010 at 12:6-10 and 12:25-34. Wilsher discloses the use of a “secondary URI” in the event of a network failure: a “*secondary URI may be a fallback URI if accessing of the URI fails* or otherwise encounters an error,” and Wilsher states that “[t]he secondary URI is preferably for an alternative media resource.” Ex-1010 at 19:48-51 (emphasis added). “[I]f retrieving the media resource fails, *the system can attempt a second time from a different URI*” or “may access the error handling communication application logic, which can handle the error in any suitable manner.” Ex-1010 at 19:51-55 (emphasis added).

154. Wilsher also teaches “*caching* transformed media resources of content URIs” and that “[a] cached media resource may be reused for a content URI.” Ex-1010 at 18:60-66 (emphasis added). Therefore, Wilsher’s cached secondary

resource is a “previously recorded media stream.” Accordingly, Wilsher’s communication platform provides previously recorded media streams in the event that a network failure is detected that affects connectivity with at least one website.

155. It would have been obvious for a POSITA to combine Wilsher’s disclosure above with the system of Avellan because Avellan already teaches the use of multiple gateway servers/caches for “redundancy” and that a recorded media stream corresponding to a website (such as CNN) can be stored in each server’s cache and can be immediately provided to a content provider requesting content from that website. Ex-1003 at 9:7-10, 9:55-57 and 10:46-56. A POSITA would have been motivated to use Wilsher’s monitoring system to take advantage of Avellan’s disclosure of storing media streams on a series of redundant servers—i.e., its use of a “fallback URI”—because this would minimize user disruption in the case of a network error or other error that impacts connectivity with a first server.

156. A POSITA would also have had a reasonable expectation of success in doing so because of the similarities in Wilsher and Avellan. Like Wilsher, Avellan already teaches the use of multiple servers for redundancy and teaches storing generated streams in cache. A POSITA would have recognized that the system of Avellan, with the described redundancy, is capable of playing back previously-cached content in the event of a server or network failure, and

implementing network failure detecting logic that provides a previously-cached video stream to the user when triggered could be done without altering the system of Avellan.

157. As a result, it is my opinion that Avellan in view of Wilsher renders Claim 20 obvious.

I. Ground 9: Claim 20 is obvious in view of Avellan and the General Knowledge of a POSITA

158. It would have been obvious for a POSITA to provide for playback of a previously recorded media stream in the event of a detected network failure affecting connectivity with a source website because Avellan already teaches the use of multiple gateway servers/caches for “redundancy” and that a recorded media stream corresponding to a website (such as CNN) can be stored in each server’s cache and can be immediately provided to a content provider requesting content from that website. Ex-1003 at 9:7-10, 9:55-57 and 10:46-56. In the event of detecting a connectivity problem with a source, it would have been a simple matter for a POSITA to use Avellan’s system to playback a previously recorded media stream. A POSITA would have been motivated to do so because this would minimize user disruption in the case of a network error or other error that impacts connectivity with a first server.

159. A POSITA would also have had a reasonable expectation of success in doing so because Avellan already teaches the use of multiple servers for

redundancy and teaches storing generated streams in cache, and a POSITA would readily understand how to detect a connectivity error and play back a cached stream in such an event. A POSITA would have recognized that the system of Avellan, with the described redundancy, is capable of playing back previously-cached content in the event of a server or network failure, and implementing network failure detecting logic that provides a previously-cached video stream to the user when triggered could be done without altering the system of Avellan.

160. As a result, it is my opinion that Avellan in view of the General Knowledge of a POSITA renders Claim 20 obvious.

IX. Materials Reviewed And Considered

161. My findings contained in this declaration are based on my education, research, experience, and background in the field of computer and communication networks, and specifically, in relation to wireless communication systems, as well as on my investigation and study of prior art references and other documents disclosed in this declaration, including the following:

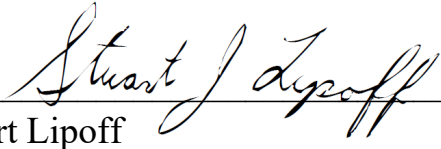
EXHIBIT NO.	DESCRIPTION
Ex-1001	The '074 Patent.
Ex-1002	This Declaration
Ex-1003	U.S. Patent No. 8,954,600 to Avellan, et al. ("Avellan"), which was filed on March 2, 2012.
Ex-1004	U.S. Patent No. 8,819,043 to Durante, et al. ("Durante"), which was filed on November 9, 2010.
Ex-1005	U.S. Patent No. 9,635,075 to Ma, et al. ("Ma"), which was filed on March 8, 2010.

EXHIBIT NO.	DESCRIPTION
Ex-1006	U.S. Patent No. 6,463,445 to Suzuki, et al. (“Suzuki”), which was filed on September 30, 1999.
Ex-1007	U.S. Patent Application Publication No. 2004/0031052 to Wannamaker, et al. (“Wannamaker”), which was published on February 12, 2004.
Ex-1008	U.S. Patent No. 7,778,279 to Heikens, et al. (“Heikens”), which was filed on June 5, 2007.
Ex-1009	U.S. Patent No. 9,264,750 to Matthews, et al. (“Matthews”), which was filed on December 23, 2010.
Ex-1010	U.S. Patent No. 9,240,966 to Wilsher, et al. (“Wilsher”), which was filed on May 8, 2014.
Ex-1011	Prosecution History of the '074 Patent.

X. Conclusion

162. The Challenged Claims simply recite concepts known in the art at the time. Thus, the Challenged Claims were either anticipated or rendered obvious by the prior art. Based on my experience, knowledge of the field at the relevant time, and a thorough analysis of prior art references, it is my expert opinion that the Challenged Claims of the '074 Patent are unpatentable.

Executed on 19Dec 2024, at Las Vegas, NV, USA.



Stuart Lipoff

Appendix A

Stuart J. Lipoff
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My practice focus deals with topics in Communications, Information, Technology, Electronics, E-Business, and Media.

I provide clients with management consulting and technology-based consulting across a wide variety of industries drawing on the base of communications industry and technology expertise. Areas of focus include--public and private network voice and data communications, cable television, cellular mobile radio, broadcasting, security systems, image processing, broadband access technology, internet applications, and consumer electronics.

EDUCATION AND CERTIFICATION:

BS Electrical Engineering- Lehigh University, 1968
BS Engineering Physics- Lehigh University, 1969
MS Electrical Engineering- Northeastern University, 1974
MBA, Suffolk University, 1983
Registered professional engineer- State of Nevada and Commonwealth of Massachusetts
Certificate in Data Processing- Institute for Certification of Computing Professionals (ICCP)
FCC general radio telephone license

PROFESSIONAL ACTIVITIES:

- Fellow of the Institute of Electrical and Electronic Engineers (IEEE)
- Member of IEEE Consumer Electronics Society Board of Governors and past president of The Society
- VP of Publications for IEEE Consumer Electronics Society
- Senior Editor IEEE Consumer Electronics Magazine
- Past Chairman Boston Section of IEEE Vehicular Technology Society
- Past Chairman Boston IEEE Boston Fall 2000 Vehicular Technology Society Conference
- Member of program committee and past conference chairman of IEEE International Conference on Consumer Electronics
- Past Chairman of IEEE Consumer Electronics Standards Committee
- Past Awards chairman of IEEE Ibuka Award for Consumer Electronics
- Elected Member, Society of Motion Picture and Television Engineers (SMPTE)
- Elected Member Society of Cable Television Engineers (SCTE)
- Elected Member Association of Computing Machinery (ACM)
- Past member of USA advisory board to National Science Museum of Israel
- Elected member of Cable TV Pioneers

PREVIOUS EMPLOYMENT:

Arthur D. Little, Inc (25 Years) - VP Communications, Info Technology, & Electronics
Motorola Communications Division (3 years) - project engineer in portable radio products
Bell & Howell Communications Company (5 years) - engineering manager for paging products

AWARDS & RECOGNITION:

- Seven U.S. patents
- Co-author of book on information systems technology: "The Arthur D. Little, Inc Forecast on Information Technology and Productivity", (1991: Wiley)
- Co-author of book on developing mobile radio technology: "New Opportunities at 220 MHz", (1991: National Association of Business and Educational Radio)
- IEEE Centennial Metal in 1984 and Millennium Metal in 2002
- A best paper award at 1989 International Conference on Consumer Electronics

**See website at <http://www.lipoff.org> for internet citations.

SUMMARY

Mr. Lipoff is president of IP Action Partners Inc, a network of consultants who provide services to stakeholders in the TIME (telecommunications, information technology, media, electronics, and ebusiness) field of interest. In providing his clients with consulting services, he draws upon his 40+ years of experience in a wide variety of technologies and industries to assist clients with knowledge-based consulting services involving complex business decisions. Clients turn to him for his unique ability to combine a deep understanding of industry dynamics with his equal depth in the underlying technologies. Because he is at home in either the board room or the laboratory, the services he provides range from top line revenue enhancement to operations and capital efficiency improvement working across all levels of the client organization. His clients include component suppliers, equipment manufacturers, service providers, and those who make investments in technology ventures. Typical assignments involve product development assistance, technology assessments, M&A corporate development, visioning the future, strategic planning, strategic business development support, competitive product positioning, change management, and overall business decision support.

He has assisted clients evaluate product development plans and apply technologies in activities ranging from conceptual studies to detailed development and implementation of products, services, and strategies. Mr. Lipoff has industry expertise in several high-volume manufacturing operations in electronics, electromechanical, and related industries. He has assisted clients in managing their technology, improving the product development process, managing complex external procurements, and resolving problems in design, procurement, and manufacturing.

Mr. Lipoff was employed 25 years by Arthur D Little, Inc (ADL) as VP and Director of Communications, Information Technology, and Electronics (CIE); 4 years by Bell & Howell Communications Company as a Section Manager, and 3 years by Motorola's Communications Division as a Project Engineer. At ADL he was responsible for the firm's global CIE practice. At both Bell & Howell and Motorola, he had project design responsibility for portable wireless

communications and paging products.

Stuart Lipoff has Bachelors Degrees in Electrical Engineering and in Engineering Physics, both from Lehigh University. He also has received a Masters Degree in Electrical Engineering from Northeastern University, and a MBA degree from Suffolk University.

Mr. Lipoff is a fellow of the IEEE Consumer Electronics, Communications, Computer, Circuits, and Vehicular Technology groups. He is a member of the IEEE Consumer Electronics Society (now Consumer Technology Society) National Board of Governors and was the Boston Chapter Chairman of the IEEE Vehicular Technology Society. He served as 1996-7 President of the IEEE Consumer Electronics Society and has served as Chairman of the Consumer Electronics Society Technical Activities and Standards Committees, served as VP of Publications for The Consumer Electronics Society with responsibility for The Society's academic and general publications, and as VP of Industrial Activities and Standards. Currently he serves as the Historian for The Consumer Technology Society. He has also chaired the search committee for Sony supported Mazura Ibuka Award in consumer electronics. As Vice President and Standards Group Chairman of the Association of Computer Users, he served as the ACU representative to The ANSI X3 Standards group. For the Federal Communications Commission's Citizens advisory committee on CB radio (PURAC), he served as Chairman of the task group on user rule compliance. He has been elected to membership in the Society of Cable Television Engineers (SCTE), The Association of Computing Machinery (ACM), and The Society of Motion Picture and Television Engineers (SMPTE).

Stuart Lipoff holds a FCC General Radiotelephone License and a Certificate in Data Processing (CDP) from the ACM supported Institute for the Certification of Computing Professionals (ICCP). He is a registered professional engineer in The Commonwealth of Massachusetts and also in the State of Nevada.

Mr. Lipoff holds seven USA patents and has published articles in Electronics Design, Microwaves, EDN, The Proceedings of the Frequency Control Symposium, Optical Spectra, and numerous IEEE publications. He has presented papers at many IEEE and other meetings. In the fall of 2000, he served as general program chair for The IEEE Vehicular Technology Conference on advanced wireless communications technology. He has organized sessions at The International Conference on Consumer Electronics and was the 1984 program chairman. He conducted an eight-week IEEE sponsored short course on Fiber Optics Systems Design. In 1984, he was awarded IEEE's Centennial Medal and in 2000 IEEE's Millennium Metal.

He served as a member of the USA advisory board to the National Science Museum of Israel and has presented a short course on international product development strategies as a faculty member of Technion Institute of Management in Israel. He has also served as a board member of The Massachusetts Future Problem-Solving Program.

Mr. Lipoff is internationally recognized as an authority and opinion leader in new economy related businesses and technology. Citations supporting his recognition can be found on his web site at <http://www.ipaction.com>.

Some examples of projects he has performed in the broadcasting, cable TV, computer products, consumer electronics, media, telecommunications, and wireless communications sectors include:

- For Comcast Corporation, he supported a number of their initiatives in public network wireless services. This support included evaluation of investment opportunities, valuation of various options for acquiring spectrum in FCC auctions, development of capital investment estimates for several alternative business opportunities, and the development of decision support models used by management to select between alternatives.
- For a provider of pay per call alternate operator services to prison inmates, he evaluated their technology and assets with an emphasis on their ability to associate calling and calling party phone numbers with databases combined with their employees with multiple language skills. Following this evaluation, he worked with the client to identify and plan for offering services to clients other than prison inmates. Examples of such clients included government operated call centers, hospitals, police departments, and telephone catalog sales call centers.
- For International Mobile Machines (IMM), a firm that licenses patents to cellphone OEMs, he developed a roadmap of future services, architectures, and technology to support alternative visions of the development of cellular. He then worked with the firm to generate R&D projects designed to increase the base of patents for IMM to license in the future.
- For International Finance Corporation (the venture capital group of The UN's World Bank), he evaluated an investment opportunity in Cellon Inc, a PRC based cellphone design house. This project included inspection of Cellon's facilities in the PRC and France as well as detailed review of Cellon's facility assets, technology strengths, and intellectual property.
- For the patent and licensing division of The General Electric Company, he has evaluated a number of patent portfolios in the wireless telecommunications space and provided feedback to the client on the application and value of these patents.
- For Tele2 (a pan European cellular and wireline telephone company), he supported their efforts to procure an advanced cordless telephone from contract manufacturers in China (PRC). This involved development of detailed technical specifications, coordination of a request for information, (RFI), and evaluation of the responses.
- For Millicom International (a cellular provider in several developing nations), he studied capital spending and developed best practice benchmarks. The work products were then employed in forward planning and to develop strategies for improvement of their financial performance. The project involved the collection of data from over 25 systems in 12 countries and developing capital efficiency metrics that were normalized to the specific geographic and demographic specifics of each system. The project not only provided a measure of present and historical capital efficiency but also provided a management system to be employed for the future.
- For the banks providing financing to The Iridium Mobile Satellite Service, he served as a technical advisor and assisted in developing the contracts between the banks and Motorola in

which Motorola secured the loan. As a technical advisor, he had extensive day-to-day interactions with Motorola's manufacturing and product design organization. The interactions included examination of the manufacturing cost, methods, and processes of Motorola's Subscriber Products Group cellphones, pagers, and related portable wireless data communications devices.

- For Sony USA, he supported a feasibility analysis of a planned investment by Sony into a wireless PCS carrier in the USA. This involved the development of alternative business models, financial analysis, and technical analysis in order to determine financial attractiveness and risk of proceeding with the venture.
- For Samsung Electronics Global Marketing, he developed a strategic framework for a line of portable and personal multimedia products to be introduced in the USA. The project included developing a common theme for a set of products that ranged from cellphones, MP3 music players, electronic books, PDAs, to hand-held games. One common theme was developed, product features and capabilities were detailed, and market adoption models were developed to forecast demand.
- For Korea Mobile Telephone, he supported the project that developed a strategic plan to position KMT relative to Korea Telecom.
- For Symbol Technology, a manufacturer of hand-held industrial computing products, he co-developed the protocol for a wireless local area network that was the basis for the current IEEE 802.11 wireless LAN standard. Later he worked with this same client to select voice over internet protocol (VoIP) codecs and algorithms that support the client's current product offering cordless industrial voice telephony over a quality of service (QoS) managed wireless IP network.
- Leadership of the project for CableLabs that studied the technology and economics of wireless personal communications technology. This project is highlighted in the history of CableLabs in their website as one of the significant accomplishments of The Labs. The project included the selection of CDMA technologies and the development of strategies to compete with incumbent cellular carriers. This effort led to the formation of a consortium between Sprint and the cable MSOs that has evolved into the present Sprint PCS business.
- For Rockwell Semiconductor, he supported a major project to identify and explore diversification opportunities beyond their current line of fax modems and compression chips. The project identified opportunities in wireless communications, broadband enterprise networks, and video signal processing. After identification of the opportunities, market forecasts were developed, competitors identified, and an analysis of the attractiveness versus fit with Rockwell was performed to support a request for board approval of diversification plans.
- For Cambridge Silicon Radio (UK), he worked with the client to develop a prioritized list of applications for their Bluetooth component offerings. The project mapped applications into specific target customers and based upon an analysis that considered the market needs with

CSR's capabilities, a prioritized roadmap of products was developed to steer the R&D portfolio.

- TCE markets cordless telephones in the USA under the GE Brand Name. The introduction of cost and size reduced imported products had an unexpected and immediate negative impact on market share. I was retained to develop modifications to the existing product to size reduce the existing product by reworking the existing inventory as well as develop a next generation product for new production. The project involved a combination of industrial design, antenna design, modification of the impedance matching electronics for the new antenna, and re-qualification of device under FCC regulations as a low power unlicensed communications device. The large telescoping antenna was replaced with a center loaded size reduced flexible antenna. An additional printed circuit board was designed and fabricated to tune and match the new antenna to the existing cordphone transceiver. Additional modifications to the transmitter involving component changes were developed to increase the transmitter power to overcome the additional loss in the loaded antenna. Manufacturing process sheets were designed and implemented in the factory to support the rework of the existing inventory. Engineering change orders were prepared for a new product design that included the changes on a single unified printed circuit board.
- For the investors in Mitel Semiconductor (Canada), he assisted the client value their telephone and business phone system telecommunications semiconductor device products and know-how in the firm. The project required a competitive review of Mitel Products and technology, and then evaluating the future likely needs of the marketplace. Our recommendations indicated which products should be the basis of further investment and most likely to be valued in a sale or licensing.
- For the flash memory global marketing group of Samsung, he led a project that explored the opportunities for flash memory in the emerging group of personal multimedia devices. These PMM devices ranged from PDAs, MP3 players, electronic books, to enhanced cellphones. The project developed visions and roadmaps for the rollout of these products and then translated this to the specific flash memory needs. A key aspect of the project was to determine the digital rights management and intelligence needs of the flash memory as content storage media. The analysis drove the Samsung developments and led to their participation in the SD flash consortium.
- For TRW, he participated in an assignment which reviewed all their non-classified military and defense technology to identify commercial applications. A number of systems applications in security for wireless communications and antifraud were developed which became the basis for successful spin-off operations. In addition, this project examined their GaAs design and production capabilities. The project resulted in foundry business for the GaAs fab in large volume consumer applications for direct to home satellite TV receivers.
- For a corporate cross-sector event organized by Motorola Corporate for all their divisions, he prepared presentations on the visions of the future in each of the major sectors in which Motorola has an interest. The presentations included: consumer electronics, medical, automotive, industrial electronics, and communications. The presentations provided a basis

for the cross-sector teams to engage in long term planning for each division.

- For a manufacturer of hand-held industrial computing products, he co-developed the protocol for a wireless local area network that was the basis for the current IEEE 802.11 wireless LAN standard. Later he worked with this same client to select voice over internet protocol (VoIP) codecs and algorithms that support the client's current product offering cordless industrial voice telephony over a quality of service (QoS) managed wireless IP network.
- Leadership of the project that studied the technology and economics of wireless personal communications technology. The project included the selection of CDMA technologies and the development of strategies to compete with incumbent cellular carriers. This effort led to the formation of a consortium between Sprint and the cable MSOs that has evolved into the present Sprint PCS business.
- For Bell South he contributed to a major operations improvement project involving developing forecasts for the future competitive environment, customer needs, a strategy to compete, and new business models. These forecasts were then applied to develop business redesign recommendations and a list of new services offerings.
- For a large multinational cellular service provider, he performed a review of their capital efficiency. The project involved the collection of data from over 25 systems in 12 countries and developing capital efficiency metrics that were normalized to the specific geographic and demographic specifics of each system. The project not only provided a measure of present and historical capital efficiency but also provided a management system to be employed for the future.
- For Tadiran, an OEM supplier of subscriber premise telephony equipment sold in multiple countries he engaged in an operations improvement project looking at all aspects of the design, manufacturing, distribution, and support of this high-volume consumer product. By means of including unique capabilities in the design of the next generation product that allowed for automatic configuration, he was able to improve the firm's performance in multiple dimensions. The new product allowed for a single universal product that reduced inventory costs, simplified distribution, and reduced order fulfillment time. A cost benefit analysis was performed to demonstrate the value of the significant investment required and showed Leadership of the project which developed the series of DOCSIS specifications for high-speed residential cable modems. The scope of work included developing a roadmap and strategic framework for evolving the business from simple high speed internet services to multimedia broadband services combining voice, data, and secure electronic content delivery. This project was performed under contract to the MCNS consortium of cable TV operators representing 85% of the subscriber base in North America and has since been adopted by the United Nations as a global telecommunications standard.
- Whistler is generally known as a large volume manufacturer of radar detectors sold to consumers to avoid speeding violations. He was retained to develop a new recreational marine product called Brite Buoy. This product was a two-part battery powered system consisting of a floating radio receiver that operates a flashing lamp and a handheld coded radio transmitter

operating at 900MHz that activates the lamp. The product was designed to allow a boat owner to find their mooring in the evening. He designed the unit to make maximum use of the existing radar receiver IF section in order to allow the benefits of large volume purchase of common components as well as reduce risk and time to market. He designed and developed a SAW Filter stabilized transmitter incorporating low-cost modulators used in garage door openers. The unit was design for manufacture using the clients existing high volume automated surface mount assembly lines.

- For B&H, he led the team that developed a digital radio paging product employing thick film hybrid RF and custom baseband integrated circuits. The project was designed for high volume manufacturing using in-house production systems.

EXPERT WITNESS ENGAGEMENTS

Case	Jurisdiction	Case Number	Witness for:
One World Technologies, Inc. v. United States, United States Department of Homeland Security, United States Customs and Border Protection, and Commissioner Kevin K. McAleenan	The United States Court of International Trade	18-00200	Plaintiff
Clearplay, Inc. v. DISH Network L.L.C. and EchoStar Technologies L.L.C.	The United States District Court for the District of Utah	2:14-cv-00191-DN	Defendant
Maxell, Ltd. v. Fandango Media, LLC	The United States District Court for the Central District of California	2:17-cv-07534-AG-SSx	Plaintiff
Sisvel International S.A., 3G Licensing S.A., and Sisvel S.P.A. v. HMD America, Inc. and HMD Global Oy	United States District Court for the Southern District of Florida; Miami Division.	20-22051-Civ-Gayles	Plaintiff
Sisvel International S.A. and 3G Licensing S.A. v. ZTE (USA) Inc. and ZTE Corporation	United States District Court for the Northern District of Texas	3:19-cv-01694-N	Plaintiff
The Chamberlain Group, Inc. v. One World Technologies, Inc. d/b/a Techtronic Industries Power Equipment	The United States International Trade Commission	337-TA-1016	Respondent
Dynamics Inc. v. Samsung Electronics, Co., Ltd.	The United States International Trade Commission	337-TA-1170	Respondent

Case	Jurisdiction	Case Number	Witness for:
Universal Electronics, Inc. v. Roku Inc., et al	The United States International Trade Commission	337-TA-1200	Respondent - Roku
Comcast Cable Communications, LLC v. Promptu Systems Corporation	The United States Patent Office Trial and Appeal Board	CBM2018-00033	Petitioner
Comcast Cable Communications, LLC v. Promptu Systems Corporation	The United States Patent Office Trial and Appeal Board	CBM2018-00034	Petitioner
TCT Mobile (US) Inc. and TCT Mobile, Inc. v. Wireless Protocol Innovations, Inc.	The United States Patent Office Trial and Appeal Board	IPR2016-01494	Petitioner
TCT Mobile (US) Inc. and TCT Mobile, Inc. v. Wireless Protocol Innovations, Inc.	The United States Patent Office Trial and Appeal Board	IPR2016-01704	Petitioner
TCT Mobile (US) Inc. and TCT Mobile, Inc. v. Wireless Protocol Innovations, Inc.	The United States Patent Office Trial and Appeal Board	IPR2016-01861	Petitioner
TCT Mobile (US) Inc. and TCT Mobile, Inc. v. Wireless Protocol Innovations, Inc.	The United States Patent Office Trial and Appeal Board	IPR2016-01865	Petitioner
One World Technologies, Inc. d/b/a Techtronic Industries Power Equipment v. The Chamberlain Group, Inc.	The United States Patent Office Trial and Appeal Board	IPR2017-00073	Petitioner
One World Technologies, Inc. d/b/a Techtronic Industries Power Equipment v. The Chamberlain Group, Inc.	The United States Patent Office Trial and Appeal Board	IPR2017-00126	Petitioner
One World Technologies, Inc. d/b/a Techtronic Industries Power Equipment v. The Chamberlain Group, Inc.	The United States Patent Office Trial and Appeal Board	IPR2017-00214	Petitioner
Live Person, Inc. v. 24/7 Customer, Inc. and 24/7 Customer International Holdings, Ltd.	The United States Patent Office Trial and Appeal Board	IPR2017-00610	Petitioner
Live Person, Inc. v. 24/7 Customer, Inc. and 24/7	The United States Patent Office Trial and Appeal Board	IPR2017-00616	Petitioner

Case	Jurisdiction	Case Number	Witness for:
Customer International Holdings, Ltd.			
One World Technologies, Inc. d/b/a Techtronic Industries Power Equipment v. The Chamberlain Group, Inc.	The United States Patent Office Trial and Appeal Board	IPR2017-01132	Petitioner
One World Technologies, Inc. d/b/a Techtronic Industries Power Equipment v. The Chamberlain Group, Inc.	The United States Patent Office Trial and Appeal Board	IPR2017-01137	Petitioner
Google Inc. v. Uniloc USA, Inc. and Uniloc Luxembourg, S.A.	The United States Patent Office Trial and Appeal Board	IPR2017-01683	Petitioner
Google Inc. v. Uniloc USA, Inc. and Uniloc Luxembourg, S.A.	The United States Patent Office Trial and Appeal Board	IPR2017-01684	Petitioner
Google Inc. v. Uniloc USA, Inc. and Uniloc Luxembourg, S.A.	The United States Patent Office Trial and Appeal Board	IPR2017-01685	Petitioner
Comcast Cable Communications, LLC v. Promptu Systems Corporation	The United States Patent Office Trial and Appeal Board	IPR2018-00342	Petitioner
Comcast Cable Communications, LLC v. Promptu Systems Corporation	The United States Patent Office Trial and Appeal Board	IPR2018-00343	Petitioner
Comcast Cable Communications, LLC v. Promptu Systems Corporation	The United States Patent Office Trial and Appeal Board	IPR2018-00344	Petitioner
Comcast Cable Communications, LLC v. Promptu Systems Corporation	The United States Patent Office Trial and Appeal Board	IPR2018-00345	Petitioner
Google LLC v. Hammon Development International, Inc.	The United States Patent Office Trial and Appeal Board	IPR2020-00020	Petitioner
Google LLC v. Hammon Development International, Inc.	The United States Patent Office Trial and Appeal Board	IPR2020-00080	Petitioner

Case	Jurisdiction	Case Number	Witness for:
Google LLC, Samsung Electronics Co., Ltd., Samsung Electronics America, Inc. LG Electronics Inc., and LG Electronics U.S.A., Inc. v. Parus Holdings, Inc.	The United States Patent Office Trial and Appeal Board	IPR2020-00846	Petitioner
Google LLC, Samsung Electronics Co., Ltd., Samsung Electronics America, Inc. LG Electronics Inc., and LG Electronics U.S.A., Inc. v. Parus Holdings, Inc.	The United States Patent Office Trial and Appeal Board	IPR2020-00847	Petitioner
Dell Inc. v. 3G Licensing S.A.	The United States Patent Office Trial and Appeal Board	IPR2020-01157	Patent Owner
Dell Inc. v. 3G Licensing S.A.	The United States Patent Office Trial and Appeal Board	IPR2020-01158	Patent Owner
Dell Inc. v. 3G Licensing S.A.	The United States Patent Office Trial and Appeal Board	IPR2020-01159	Patent Owner
Dell Inc. v. 3G Licensing S.A.	The United States Patent Office Trial and Appeal Board	IPR2020-01160	Patent Owner
Dell Inc. v. 3G Licensing S.A.	The United States Patent Office Trial and Appeal Board	IPR2020-01161	Patent Owner
Dell Inc. v. 3G Licensing S.A.	The United States Patent Office Trial and Appeal Board	IPR2020-01162	Patent Owner
Dell Inc. v. 3G Licensing S.A.	The United States Patent Office Trial and Appeal Board	IPR2021-00584	Patent Owner
Google LLC v. Parus Holdings, Inc.	The United States Patent Office Trial and Appeal Board	IPR2022-00279	Petitioner
Google LLC, Samsung Electronics Co., Ltd., Samsung Electronics America, Inc. LG Electronics Inc., and LG Electronics U.S.A., Inc. v. Parus Holdings, Inc.	The United States Patent Office Trial and Appeal Board	IPR2022-00355	Petitioner

Case	Jurisdiction	Case Number	Witness for:
Google LLC, Samsung Electronics Co., Ltd., Samsung Electronics America, Inc. LG Electronics Inc., and LG Electronics U.S.A., Inc. v. Parus Holdings, Inc.	The United States Patent Office Trial and Appeal Board	IPR2022-00358	Petitioner

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