

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. IPR2025-00350
U.S. PATENT NO. 10,524,002

DECLARATION OF MR. STUART LIPOFF

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TABLE OF EXHIBITS

Exhibit	Short name	Description
Ex-1001	'002 Patent	U.S. Patent No. 10,524,002
Ex-1002	'002 File History	File History of U.S. Patent No. 10,524,002
Ex-1003	Avellan	U.S. Patent No. 8,954,600
Ex-1004	Ma	U.S. Patent Application Publication No. 2014/0150019
Ex-1005	Fain	"Java Programming 24-Hour Trainer", Yakov Fain
Ex-1006	Wannamaker	U.S. Patent Application Publication No. 2004/0031052
Ex-1008	Munford Decl.	Declaration of June Munford including <i>Curriculum Vitae</i>
Ex-1009	'074 Patent	U.S. Patent No. 10,123,074
Ex-1010	'074 File History	File History of U.S. Patent No. 10,123,074
Ex-1011	Luthra	U.S. Patent Application Publication No. 2014/0068690
Ex-1012	SAC	Second Amended Complaint from related litigation, Case No. 1:24-cv-21226
Ex-1013	Sarginson	P.A. Sarginson, "MPEG-2: a tutorial introduction to the systems layer," IEE Colloquium on MPEG-2 – What it is and What it isn't, London, UK, 1995, pp. 4/1-4/13

LIST OF APPENDICES

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

LIST OF CHALLENGED CLAIMS

Element	Claim Language
Claim 1	
[1 pre]	A computer-implemented method, comprising:
[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;
[1b]	obtaining content corresponding to the plurality of multimedia items from at least one source offering the content in at least one first format;
[1c]	rendering a web page by a browser using the content;
[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;
[1e]	assembling the at least one media stream using the temporal sequence of screen captures; and
[1f]	providing the at least one media stream to the content provider for broadcast on the broadcast media channel;
[1g]	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; and
[1h]	wherein the web page is rendered in parallel in multiple threads.
Claim 2	
[2]	The method according to claim 1, wherein the at least one media stream is interacted with MPEG two way control messages.
Claim 3	
[3]	The method according to claim 1, wherein MPEG messages are sent to a service provider via a unicast address.
Claim 4	
[4 pre]	A computer-implemented method, comprising:
[4a]	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;
[4b]	obtaining content corresponding to the plurality of multimedia

Element	Claim Language
	items from at least one source offering the content in at least one first format;
[4c]	rendering a web page by a browser using the content;
[4d]	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;
[4e]	assembling the at least one media stream using the temporal sequence of screen captures; and
[4f]	providing the at least one media stream to the content provider for broadcast on the broadcast media channel;
[4g]	wherein assembling the at least one media stream comprises inserting at least one MPEG packet including metadata corresponding to the multimedia item; and
[4h]	wherein the web page is rendered in parallel in multiple threads.
Claim 5	
[5]	The computer-implemented method of claim 4, wherein the at least one media stream is interacted with MPEG two way control messages.
Claim 6	
[6]	The computer-implemented method of claim 4, wherein MPEG messages are sent to a service provider via a unicast address.
Claim 7	
[7 pre]	A system, comprising:
[7a]	a multicast server configured to generate parameters relating to at least one of video content, image content and audio content, and configured to output the parameters via MPEG outputs;
[7b]	a caching server communicatively coupled to the multicast server,
[7c]	and configured to receive and store the parameters,
[7d]	create a temporal sequence of screen captures of a rendered web page, where each said screen capture defines content of the rendered web page at a given time, and at least two adjacent screen captures in the temporal sequence illustrate a dynamic change of at least a portion of the video content, image content or audio content over time,
[7e]	assemble the temporal sequence of screen captures, and
[7f]	provide at least one of the video content, image content and audio

Element	Claim Language
	content to the multicast server for generating a multicast stream with MPEG encoded video and audio; and
[7g]	a monitoring system configured to maintain generation of video and audio files, even in failure cases.
Claim 8	
[8]	The system according to claim 7, further comprising multiple servers for load balancing and fault-tolerance.
Claim 9	
[9]	The system according to claim 7, wherein the multicast server is selected to communicate a multicast stream available for a broadband network.
Claim 10	
[10]	The system according to claim 7, wherein the video content is encoded in a video streaming format so as to generate a unicast stream.
Claim 11	
[11]	The system according to claim 7, wherein the system generates audio MPEG files and add [sic] metadata in an MPEG frame.
Claim 12	
[12]	The system according to claim 7, wherein the system generates MPEG metadata that is interacted with two way broadcast TV systems.
Claim 13	
[13 pre]	A computer-implemented method, comprising:
[13a]	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;
[13b]	obtaining content corresponding to the plurality of multimedia items from at least one source offering the content in at least one first format;
[13c]	rendering a web page by a browser using the content;
[13d]	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;
[13e]	assembling the at least one media stream using the temporal

Element	Claim Language
	sequence of screen captures; and
[13f]	providing the at least one media stream to the content provider for broadcast on the broadcast media channel;
[13g]	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; and
[13h]	wherein the web page is rendered in parallel in virtual instances or virtual machines.

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., (“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. 10,524,002 (“’002 Patent” or “Patent-at-Issue”), Ex-1001.¹

2. I understand that the Petition for *Inter Partes Review* involves the ’002 Patent (Ex-1001) and I will provide my opinion regarding Claims 1–13 (“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 necessary opinions, including documents that may not yet have been provided to

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

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 '002 Patent, 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 '002 Patent.

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 distractions	7/23/2008
US-RE44274-E	Ubiquitous imaging device based check	3/14/2012

ID	Title	Filing Date
	image capture	
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

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

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 '002 Patent 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 '002 Patent and logically would have commended themselves to an inventor's attention considering the problems of the '002 Patent.

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 '002 Patent is December 22, 2014. *See* Ex-1001 at (60).

V. Level of Ordinary Skill

67. Assuming that the priority date of the '002 Patent 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 '002 Patent, a person of ordinary skill in the art at the time of the alleged invention of the '002 Patent would have a bachelor's or equivalent degree in computer science or a related field and at least 2 years of experience in multimedia processing or delivery using internet protocols.

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

VI. Overview of the '002 Patent

A. Summary of the Patent

70. The '002 Patent has 13 claims. Claims 1, 4, 7, and 13 are independent claims.

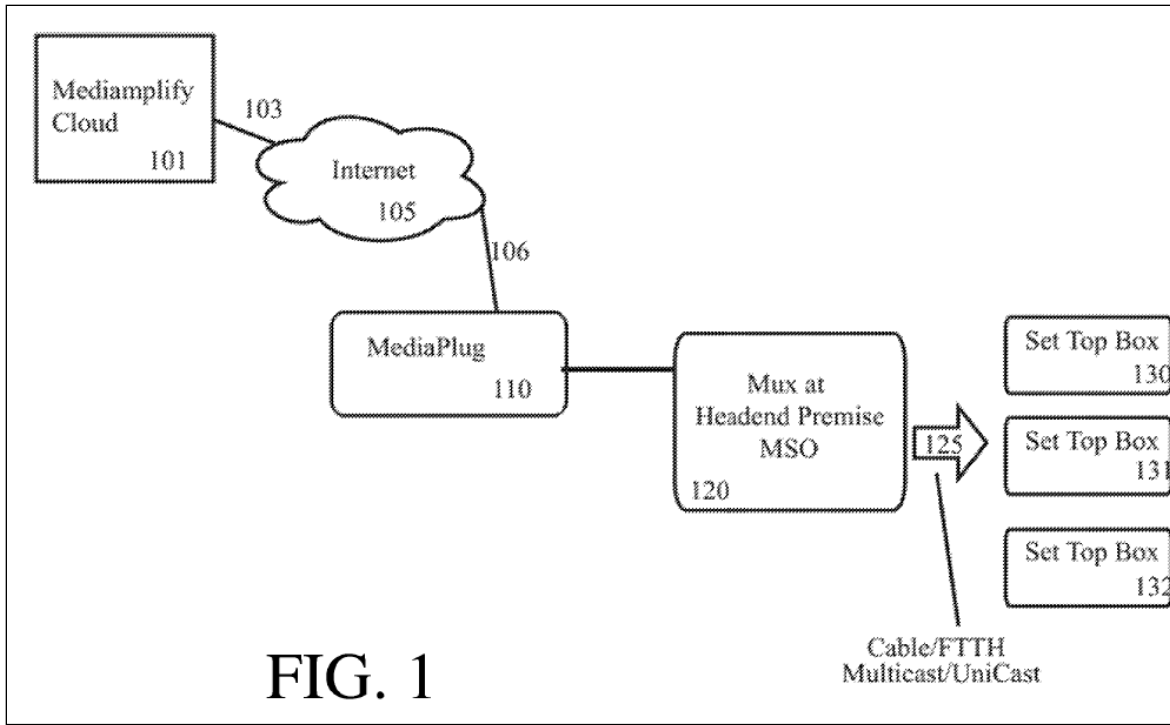
71. The '002 Patent is generally directed to “a mechanism for delivering multimedia content from a cloud-based system to cable or satellite content providers.” Ex-1001, 1:19-21.

72. At a high level, the '002 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.

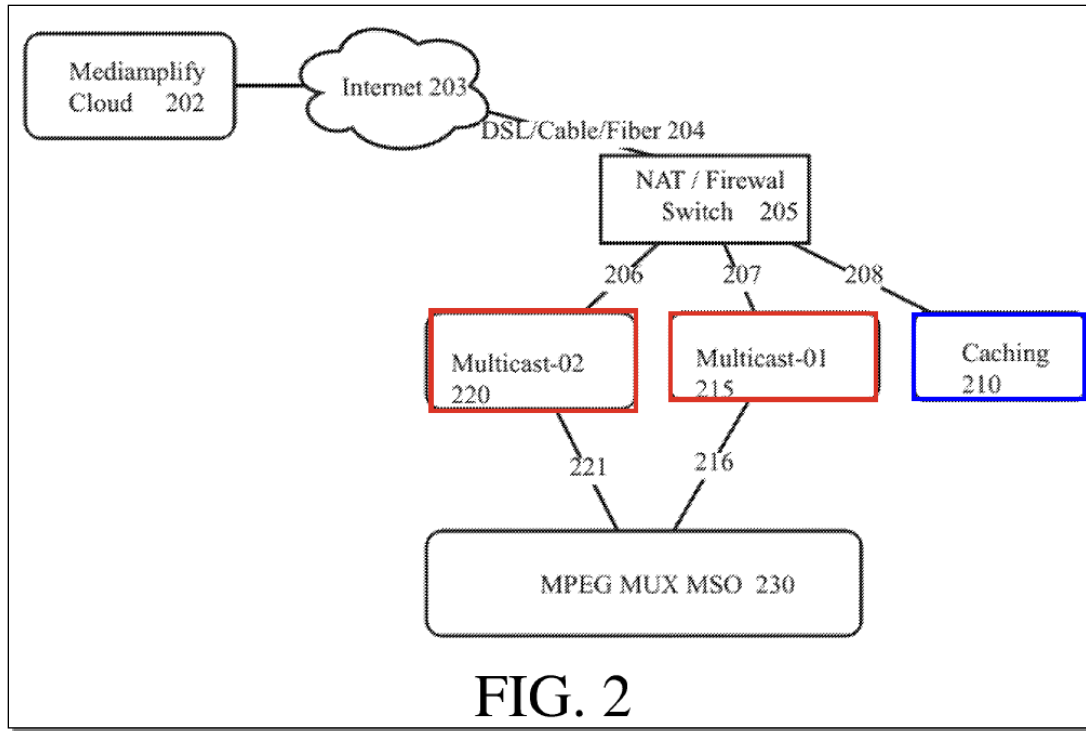
Ex-1001, 2:53-67.

73. Figure 1 of the '002 Patent is reproduced below.



74. As shown in Figure 1, the '002 Patent discloses a Mediaplug 110 unit that is in communication with the cloud 101 through the internet 105. Ex-1001, 3:63-4:17. 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.*, 4:17-24. 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.*, 4:25-33.

75. Figure 2 of the '002 Patent is reproduced below (coloring has been added).



76. As shown in Figure 2, the hardware components of the Mediaplug 110 which includes three servers. Ex-1001, 4:49-51. 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.*, 4:66-5:2. 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.*, 5:3-9.

77. As discussed in the following section, the following two limitations were deemed allowable during prosecution: (1) “wherein the webpage is rendered in parallel in multiple threads”; and (2) “a monitoring system configured to

maintain generation of video and audio files, even in failure cases.” Ex-1002, 35-44, 96-97. These limitations were incorporated in the independent claims by the applicant to place the claims in condition for allowance. *Id.*, 27-34.

78. As to the first added limitation, the term “thread” is used only once in the specification: “The caching unit encodes audio and video, and can use the disk space in the Mediaplug. Hence in 508 the method checks for sufficient space left in the memory or hard drive. This task can be run on a thread together with all the other tasks that are working in parallel in order to speed up the processes of encoding and transcoding.” Ex-1001, 6:43-48.

79. As to the second limitation, the specification discloses (1) “Monit 750 corresponds to a monitoring block that can ensure that the process running the ‘Media Parallel encoder’ keeps running at all times and does not stop upon failure.” *Id.*, 8:63-66; (2) “the multicast-01 and multicast-02 blocks contain a ‘Recording’ function 790, which is in charge or (*sic.*) recording the multicasting streams and recording for later use in case of failure on the system.” *Id.*, 9:55-58; (3) “In one embodiment, the streamer can perform functions that include: connect to the caching unit; retrieve generated videos per playlist; determine if unit is working in fault-tolerant mode; playback pre-recorded audio if a failure is detected....” *Id.*, 9:66-10:4; and (4) “In the case that there are no ping responses, a timeout will trigger a failure and a pre-recorded content 820 will be played or sent

to the multicast address and port of record.” *Id.*, 10:42-45.

B. Prosecution History of the Patent & State of the Art

80. It is my understanding that the ’002 Patent claims priority to U.S. Patent No. 10,123,074 (“the ’074 Patent”). Ex-1001 at (63).

81. I will first provide an overview of the file history of the ’074 Patent and then an overview of the file history of the ’002 Patent.

82. During prosecution of ’074 Patent, the Examiner rejected the original independent claims as anticipated by the cited prior art. Ex-1010, 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-1010, 62. Based on the Patent Owner’s amendment and his representation that this addition was “an important distinction” over the cited prior art (Ex-1010, 69), the Examiner allowed the claims of the ’074 Patent without further rejection. Ex-1010, 21-23.

83. With respect to the added “rendering” language, the specification 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, 7:2-6.

84. With respect to the added “screen capture” language, the specification states that “rendered images from a web service can be used to create overlapping video or replace any video in the video feed file.” *Id.*, 7:7-9. 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.” *Id.*, 7:16-23.

85. 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 ’002 Patent acknowledges the availability of these tools to POSITA. Ex-1001, 7:16-23.

86. Accordingly, the ’002 Patent explicitly discloses that both the “rendering” and “screen capture” limitations can be performed using commonly-known and readily-available third-party software tools, such as PhantomJS and/or QtCapture.

87. 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.*, 7:26-29. “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.*, 7:41-45; *see also* 7:34-36.

88. 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 POSITA.

89. Accordingly, the screen captures generated using the process discussed in the '002 Patent can be multiplexed using commonly-known and readily-available third-party tools like FFMPEG or VLC.

90. Similarly MPEG and its features were well known to POSITA since at least 1995. MPEG (motion picture experts group) is a family of international standards including a systems standard called an MPEG2 transport stream that was introduced as early as 1994. MPEG2 is also known as ISO/IEC 13818-1 is also designated as ITU-T Rec. H.222.0 when published by the United Nations International Telecommunications Union (ITU).

91. Among the family of MPEG standards are means to process raw

digital multimedia such as video and audio to compress the high bandwidth digital signals so that the signals can be sent over lower speed transmission systems such as common with video systems such as cable TV, satellite, and over the air broadcast networks. More recently such as in the 2014 time frame of the challenged patents, MPEG has been employed in the internet delivery of multimedia content in both 1way broadcast as well as 2way interactive applications.

92. The early MPEG1 versions in the MPEG family focused on the compression of digital multimedia and with the release of the MPEG2 specifications in 1995 the family was expanded to include the concept of a “Transport Stream.” For instance, some of the fundamental principles of the MPEG-2 System layer were discussed in 1996 by P.A. Sarginson² which provides evidence of the state of the art prior to the filing date of the '002 Patent.

93. Basically MPEG2 provided protocols to send a single signal that aggregated many separate programs into a single signal. Each program could contain one or more, audio, video, and data streams and the signal would contain program specific metadata information that would allow the receiver of the signal

² P.A. Sarginson, “MPEG-2: a tutorial introduction to the systems layer,” IEE Colloquium on MPEG-2 – What it is and What it isn’t, London, UK, 1995, pp. 4/1-4/13 (attached as Ex-1013).

to separate the multi-program received signal into individual programs. The data stream in an MPEG program typically included information to facilitate two-way interactivity associated the audio and video in the same program

94. Accordingly, MPEG and the use of MPEG Transport Stream output format was commonly known to POSITA and widely used prior to the filing date of the '002 Patent.

95. As a result, the above features of the Challenged Claims are all directed to the combined use of commonly-known processes, software tools and transport formats that pre-existed the '002 Patent's priority date

96. The independent claims of the '002 Patent mirror the claims of the parent '074 Patent and each include one additional limitation. Specifically, during prosecution of the '002 Patent application, applicant filed a preliminary amendment replacing claims 1-23 with new claims 24-38. Ex-1002, 95-97. Except for dependent claims 26, 30 and 36 which were deemed allowable, the remaining claims were rejected on grounds of double-patenting in view of the '074 Patent alone or in combination with other references. Ex-1002, 37-43. Claims 26 and 30 added the "multiple threads" limitation (i.e., "wherein the web page is rendered in parallel multiple threads") and claim 36 added the "monitoring system" limitation (i.e., "a monitoring system configured to maintain generation of video and audio files, even in failure cases"). Ex-1002, 96-97. In response, applicant did not

traverse the rejections and instead, amended independent claims 24, 28 and 39 to incorporate the “multiple threads” limitation and amended independent claim 32 to incorporate the “monitoring system” limitation of allowable claims. Ex-1002, 28-31. The Examiner then issued a notice of allowance. Ex-1002, 7-14.

97. As discussed below, the use of multiple threads and a monitoring system was commonly known prior to the filing date of the '002 Patent.

98. Specifically, it was well known to use tools like Java programming to render web content in parallel in multiple threads. Doing so would have several advantages. For example, in a system with multiple processors this approach would significantly improve the speed with which content is delivered as well as result in lower overall costs since less hardware would be required as needed to support large numbers of subscribers.

99. Similarly, monitoring a system and providing a fault tolerance was well known to POSITA at the time. Network Operations Centers (NOCs) employing well known prior art SNMP (Simple Network Monitoring Protocols) were commonly used in complex IP based distribution networks as early as the early 90s. It was common for such monitoring systems installed at NOCs to automatically send SNMP traps to trigger failover to backup systems to provide fault tolerance upon the detection of network failures.

100. Therefore, the Challenged Claims are all directed to an assemblage of

pre-existing commonly-known processes, software tools and transport formats.

VII. Overview of the Prior Art

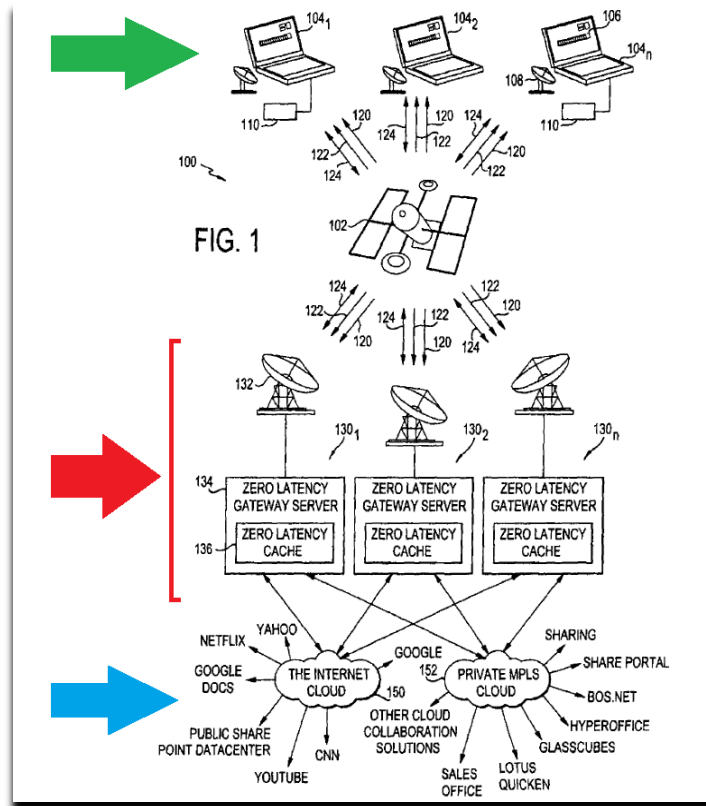
A. Avellan

101. 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 '002 Patent.

102. 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.

103. 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.

104. 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.

105. Avellan is in the same field of endeavor as the '002 Patent.

B. Ma

106. Ma is U.S. Patent Application Publication No. 2014/0150019 to Ma, et al., which was published on May 29, 2014. It is my understanding that Ma is prior art to the '002 Patent.

107. Ma generally relates to over-the-top (OTT) media delivery for targeted advertisement replacement for near-real-time streaming media. Ex-1004, [0001]. Specifically, Ma discloses a system which includes “a live stream processor, an HTTP client, and an ad segment proxy that collectively include a variety of mechanisms usable in different ways for ad replacement.” Ex-1004, [0004].

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

C. Fain

109. Fain is “Java Programming 24-Hour Trainer”, Yakov Fain, published by Wiley Publishing, Inc.(“Fain”). It is my understanding that Fain is prior art to the '002 Patent.

110. Fain is a training book “for anyone who wants to learn how to

program with the Java language” and includes a chapter titled “Introduction to Multi-Threading.” Ex-1005, xxi, xxix.

111. Fain is in the same field of endeavor as the Patent-at-Issue. Specifically, the '002 Patent references the use of multiple parallel threads and Fain discloses well known prior art means of using Java to support the use of such multiple parallel threads.

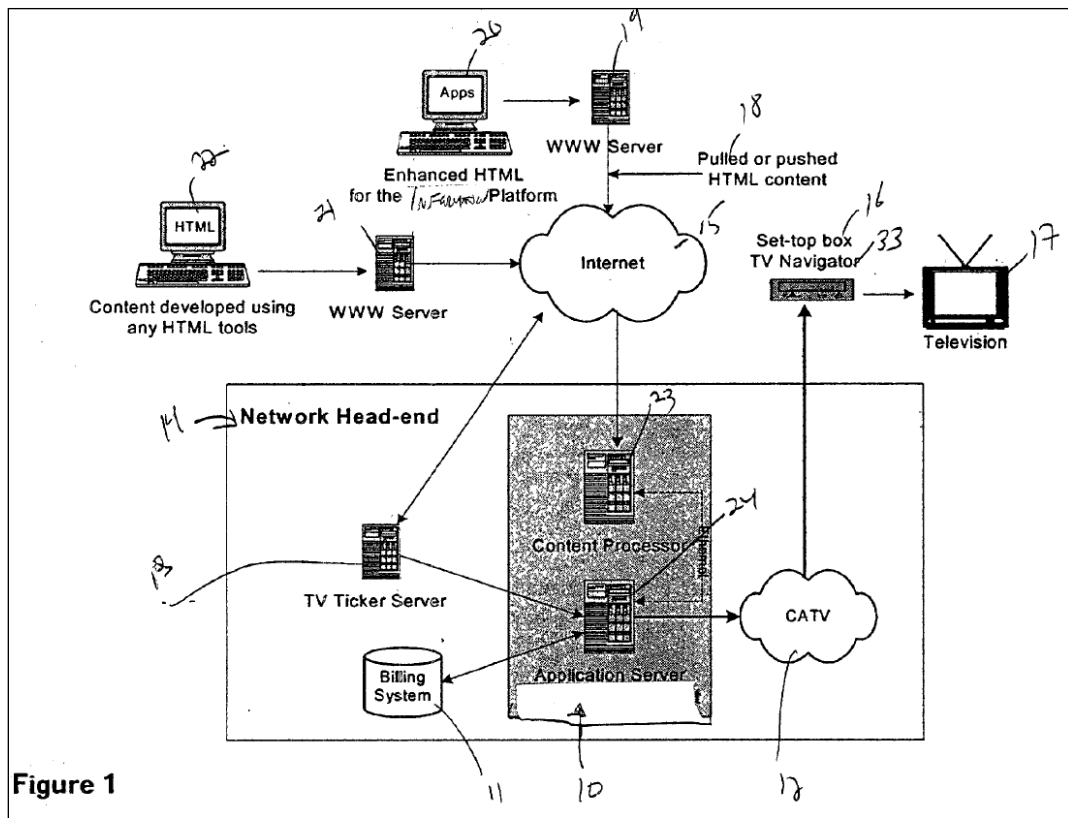
D. Wannamaker

112. Wannamaker is U.S. Patent Application Publication No. 2004/0031052 to Wannamaker, et al., which was published on February 12, 2004. It is my understanding that Wannamaker is prior art to the '002 Patent.

113. Wannamaker discloses a “middleware solution” referred to as an “information platform” which “provides a platform for cable system operators to deliver a full range of sophisticated new products to cable television subscribers.” Ex-1006 [Abstract]. “The information platform mediates the communication between [] Web-based content and the television set” by “convert[ing] Internet content and protocols into forms suitable for TV viewing” and “supports HTML 3.2, including text, tables, forms, images, animated images, image maps, frames, and background images.” Ex-1006, [0098], [0136], [Abstract].

114. As shown in Fig. 1 (below), the information platform “consists of application servers 10 installed at the network head end 14 and hosted on a Unix

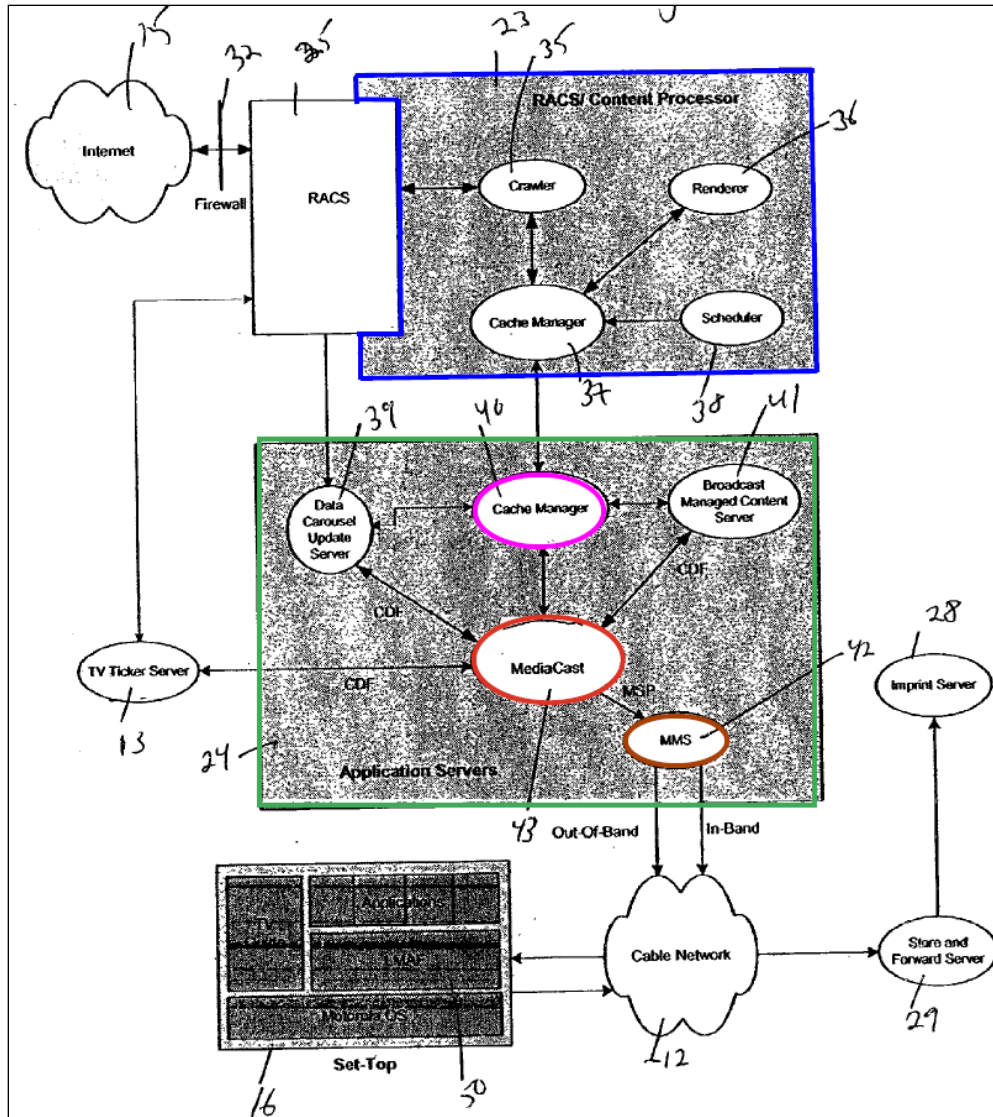
platform, and the TV navigator client hosted on a set-top box 16.” Ex-1006, [0058]. The disclosed system provides “proprietary applications, third-party applications, and managed broadcast content to subscribers, along with broadcast television.” *Id.* “The application server transcodes Web pages into a format that is viewable on the set-top box.” *Id.*, [0132].



115. The application server allows “exchange of information with a CATV system 12 and the Internet 15.” Ex-1006, [0059]. “The CATV system provides communications between the application server and the subscriber set-top box 16 on which a TV navigator is running 33 and to which the subscriber’s television 17 is connected.” *Id.*, [0059]. The application server is also connected (via the

internet) “to one or more WWW servers 19, 21, which support systems that supply enhanced HTML 20 to provide pushed or pulled HTML content 18 to subscribers; and systems 22 which supply content that is developed using any HTML tools.” *Id.*, [0059].

116. Fig. 3 (below) shows the “process of collecting, caching, transcoding, and delivering content” with the arrows indicating data flows. Ex-1006, [0099]. The application server 10 is comprised of an application server processor 24 (green) and a content processor 23 (blue). *Id.*, [0059], [0064]. The content processor 23 retrieves and transcodes HTML broadcast managed content into I-frames, and data to be displayed by the microbrowser on the set-top box 16. *Id.*, [0068].



117. The application server (24) hosts a variety of processes including the host monitoring server, the Information Mediacast (data carousel server and multimedia streamer), and the broadcast managed content server. *Id.*, [0069]-[0076]. The information Mediacast server manages requests to transmit the carousels of data and image files and is composed of the data carousel server (red) for data formatting, and Multimedia Streamer (MMS) components (brown) for data transmission. *Id.*, [0169]. The 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." *Id.*, [0193]. Specifically, "[t]he AVTS is responsible for delivering MPEG video and Dolby AC-3 audio streams to the set-top box" using an MPEG multiplexer (MUX) card. *Id.* at [0195].

118. The content processor 23 "produces digital cable system compatible (rendered) content from standard Web content retrieved from the Internet" and cache managers (37, 40) support "smart caching" operations between the application server 24 and the content processor 23. *Id.*, [0235]-[0244].

119. Wannamaker also discloses a microbrowser feature which uses a thin client model to provide a web browser function on the digital set-top boxes by continuously transmitting web data to the client in an MPEG video stream. Ex-1006, [0267]-[0273].

120. Wannamaker is in the same field of endeavor as the '002 Patent.

VIII. Grounds of Invalidity

A. Ground 1: Claims 1-6, 13 are obvious in view of Avellan.

121. Based on the citations in the Petition and the accompanying explanations, it is my opinion that Avellan renders claims 1-6 and 13 obvious.

122. **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 '002 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.

123. Therefore, Avellan discloses this element.

124. **With respect to Element 1g**, Avellan discloses that “a web-to-HD video protocol may be used to capture and transmit images/audio of a web page, including a full multimedia web page, regardless of its size or original format (e.g., HTTP).” Ex-1003, 5:16-19. Specifically, in Avellan “[t]he gateway cache 136 preferably stores the web pages in the compressed video format, but can store the data in any suitable format(s) including HTTP format.” Ex-1003, 8:50-53. Additionally, Avellan discloses transmission of live content, including “live

streaming television feeds” and “live broadcasting.” Ex-1003, 8:18-21; 12:37.

125. A POSITA would recognize that Avellan contemplates the use of a video transfer protocol and would be motivated to apply a commonly-known transmission protocol that was tailored for the delivery of live content.

126. HLS sends audio and video as a series of small files (called media segment files) and an HTTP playlist provides an ordered list of the URLs of the media segment files. The use of HLS to deliver live and on-demand audio and video streams from the internet has been well known since at least 2009. Similarly, RTSP is a network protocol that controls the streaming of media content over the internet and has been well known since at least 1998. HLS and RTSP would have been obvious design choices as standard protocols that enable Quality of Service (QOS) management of variable bit rate video over the internet and a POSITA would have used them use them with a reasonable expectation of success. Accordingly, in light of Avellan alone a POSITA would understand that one way to deliver Avellan’s “live streaming television feeds” would be to use well-known and widely used tools such as HLS or RTSP.

127. That the use of such well known protocols was an obvious design choice is further confirmed by the fact that during prosecution the Examiner found that this element was not new in view of US 2014/0068690 to Luthra (Ex-1002 at 39 citing Ex-1011 Luthra at [0013]) and applicant did not traverse.

128. Therefore, element 1g would have been obvious to a POSITA in view of Avellan alone.

129. **With respect to Element 1h**, as shown in [1c] in the Petition, Avellan discloses rendering a web page by a browser using the content. Avellan further states that the disclosed steps of Fig. 2 “may be performed in parallel.” Ex-1003, 14: 4-7. Avellan also references Java and acknowledges that it was well known in the art. Ex-1003, 13:40-41. Java is a programming language that can process multiple threads in parallel and Java would have been well known to a POSITA. Given that Avellan discloses performing the process in parallel, a POSITA would have been motivated to use Java to execute multiple threads in parallel in Avellan. It would have been beneficial to use multiple threads that operate in parallel in view of Avellan because (1) it would allow faster rendering by a browser; and (2) it would facilitate efficient use of multi-processor cores that were ubiquitous as of the priority date of the '002 Patent. Therefore, element 1h would have been obvious to a POSITA in view of Avellan alone.

130. **With respect to Element 2**, Avellan discloses that the media stream can be interacted with. Specifically, Avellan discloses the use of a tag file which “retains the functionality of the website on the browser 106” allowing user interaction Ex-1003 at 13:45-46. The tag file maps the desired website and includes positions of the scroll bar click, prompt locations, and other action points

on the website. Ex-1003 at Avellan 13:43-59. Therefore, Avellan implicitly discloses the use of two way control messages because these cite items are meant for user interaction.

131. Further, Avellan discloses that the web page data may be compressed “into a compressed digital video format that can be sent to the user computer 104 for display in the browser.” Ex-1003, 5:19-22. A POSITA would understand that MPEG is a compressed digital video format that was well known at the time. That MPEG includes two way control messages was also well known to POSITA.

132. Because Avellan discloses two way interaction and use of compressed digital video formats such as MPEG, it would have been an obvious design choice for a POSITA to use MPEG two way control messages as a mechanism to facilitate such interaction in Avellan. Accordingly, POSITA would have found it obvious to use MPEG two way control message to interact with the media stream of Avellan. Therefore, element 2 would have been obvious to a POSITA in view of Avellan alone

133. **With respect to Element 3**, Avellan discloses a “unicast mode” where “the user requests unicast data (e.g., less-popular websites or websites having highly user-customized information) at the browser” and the “gateway server images that one web page, compresses the unicast data, and transmits the compressed unicast data over the broadcast device substantially in real time to the

one requesting user computer.” Ex-1003, [Abstract]. Avellan further discloses transmitting “digital video images of a web page” to a user in the unicast mode. Ex-1003, 11:3-10. As discussed with respect to element 2, was well known to a POSITA that MPEG is a standard for compression and transmission of digital video images that has been around since at least 1995. Moreover, it was well known to a POSITA that an MPEG stream includes MPEG messages. Therefore, it would have been obvious to a POSITA to send MPEG messages to a service provider via Avellan’s unicast mode. Therefore, element 3 would have been obvious to a POSITA in view of Avellan alone.

134. **With respect to Element 4g**, Avellan discloses that the web page data may be compressed “into a compressed digital video format that can be sent to the user computer 104 for display in the browser.” Ex-1003 at 5:19-22. A POSITA would understand that MPEG is a compressed digital video format that was well known at the time. Moreover, it was well known to POSITA that MPEG packets include metadata corresponding to the multimedia item. Therefore, a POSITA would have found this limitation obvious in view of Avellan. Therefore, element 4g would have been obvious to a POSITA in view of Avellan alone

135. **With respect to Element 13h**, the web page being rendered in parallel is obvious in view of Avellan as discussed in conjunction with element 1h.

136. Additionally, Avellan discloses using a virtual browser and therefore,

teaches that the web page is rendered in virtual instances or virtual machines. Ex-1003 at 3:27-34 (“The user utilizes a virtual browser 106 at a display of one of the user computers 104₁-104_n, to access the remote networks 150, 152 through the broadcast device 102 and the remotely-located gateway platform 130₁-130_n. The virtual browser 106 controls the gate way server 134 and is a remote client of the remotely-located gateway server 134. Thus, the user computers 104₁-104_n can be a dumb terminal which runs the browser 106.”); 4:18-25 (“Generally, the system 100 provides for the user computers 104-104, to access the Internet 150 and/or private network cloud 152 through a virtual browser 106 of the gateway 130. The user operates the browser 106 which sends a signal over the satellite 102 to the gateway 130. The gateway 130 accesses the networks 150, 152 and returns the results to the virtual browser 106 via the Satellite 102.”); 4:56-61 (“As mentioned above, the 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. Because the browser 106 functions as a virtual browser, viruses that attack operating systems and threaten users’ security are unable to infest the users individual computing devices.”); 6:55-58 (“It will be apparent that the virtual browser 106 can be any software application which can display the received video frame data to look like the web page is actually being displayed in a browser.”).

137. Moreover, the use of a “virtual machine” or a “virtual instance” to

render a webpage was well known to POSITA and would have been an obvious design choice. (*see, e.g.*, Ex-1005 at 7, 104 (disclosing the use of a Java Virtual Machine (“JVM”) and Adobe Flash Player). A POSITA would recognize that it would be beneficial to use such a virtual machine because doing so would reduce system requirements at the user device.

138. Therefore, element 13h would have been obvious to a POSITA in view of Avellan alone.

B. Ground 2: Claims 1-6 and 13 are obvious in view of Avellan, Ma, and Fain.

139. Based on the citations in the Petition and the accompanying explanations, it is my opinion that Avellan in view of Fain and Ma renders claims 1-6 and 13 obvious.

140. **With respect to Element 1g**, Ma discloses a “live stream processor 102 [that] is responsible for acquiring source content from a live feed and preparing the content for distribution.” Ex-1004, [0033]. The “source content” of Ma includes media streams such as “real-time audio/video content.” Ex-1004, [0031]. Ma further discloses that:

In one embodiment, the prepared output files are segmented into fixed duration segment files (e.g., MPEG-TS segments, fragmented MP4 segments, 3GP DASH segments, etc.) . . . In one embodiment, the live stream processor 102 generates manifest files indicating

segment retrieval locations for each encoding (e.g., HLS
m3u8, DASH MPD, etc.).

Ex-1004, [0033]. M3u8 is an HTTP playlist file used to define a multimedia playlist for HLS. Ma further discloses a “live stream recorder 202” that is “responsible for attaching to the live feed using various protocols” including HLS. Ex-1004, [0045]. Therefore, Ma discloses having a media stream that corresponds to HLS and an HTTP playlist.

141. It would have been obvious for a POSITA to combine Ma’s 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 most Internet devices that transmit video via HTTP-, which makes it simple to implement and interoperable.

142. Avellan teaches 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. Moreover, as disclosed in Avellan, the gateway cache 136 can store the data in any suitable format(s) including HTTP

format. Ex-1003, 8:50-53. Additionally, Avellan discloses transmission of live content, including “live streaming television feeds” and “live broadcasting.” Ex-1003, 8:18-21; 12:37. As discussed above, HLS and RTSP are standard protocols well known to POSITA and widely used long before the filing date of the ’002 Patent. Ma is directed to performing “targeted advertisement replacement for near-real-time streaming media.” Ex-1004, [0001]. Both Ma and Avellan are generally directed to providing web content in a media stream to subscribers. A POSITA would recognize that it would be beneficial to use a media stream corresponding to a standard protocol such as HLS or RTSP as disclosed by Ma in Avellan since the use of such standardized protocols allows interoperability and simplifies implementation. Therefore, a POSITA would have been motivated to combine the teachings of Ma with Avellan.

143. A POSITA would have had a reasonable expectation of success because HLS can be implemented on a server that uses HTTP such as in Avellan as a standard transport protocols that would simplify the transmission of Avellan’s media streams. 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 ’002 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 8:54-57.

144. Accordingly, in light of a combination of Avellan with Ma, a POSITA would understand that one way to deliver Avellan’s “live streaming television feeds” would be to use well-known and widely used protocols such as HLS or RTSP. Therefore, element 1g would have been obvious to a POSITA in view of Avellan and Ma.

145. **With respect to Element 1h**, Fain is a book titled “Java Programming 24-Hour Trainer” and includes a chapter titled “Introduction to Multi-Threading” which discusses Java’s multi-threading capability stating, for example, that “a Java program can start multiple threads of execution that will run in parallel.” Ex-1005 at 209. Fain adds that “[w]eb browsers maintain two or more connections to any website, and can download multiple resources (text, images,

videos, music) at the same time. Any web browser works in a multi-threaded mode.” Ex-1005, 209. Therefore, it would have been obvious to combine Avellan’s capture and distribution with Fain’s multi-threading distribution in parallel to more efficiently deliver the types of digital multimedia content disclosed in Avellan.

146. A POSITA would have been motivated to combine Avellan and Fain. Avellan discloses rendering web content and provides that the disclosed steps “may be performed in parallel.” Ex-1003, 14: 4-7. Avellan also references Java and acknowledges that it was well known in the art. Ex-1003, 13:40-41. Java was a well-known programming language to POSITA that allowed for parallel processing of multiple threads. A POSITA would have been motivated to combine the two to implement the multiple parallel Java threads in Avellan because doing so would be inherently efficient in a multiprocessor system where “parallel threads can run on different CPUs” and “[e]ven if you have only one processor ... it could still be a good idea to run some tasks in parallel.” Ex-1005, 209-210. A POSITA would have had a reasonable expectation of success in combining Avellan with Fain’s parallel threads to facilitate efficient content delivery.

147. The use of Ma with respect to the separately recited function of element 1g is not affected by Fain and would not affect Fain, as they are directed towards different aspects of the claim. Therefore, no additional motivation to

combine Avellan and Fain with Ma is required. Nevertheless, it would have been obvious to use both the standard protocol of Ma as discussed in element 1g and the parallel multiple threads of Fain in conjunction with Avellan.

148. It would have been obvious to a POSITA to render the Avellan web page in parallel in multiple threads using Java considering Avellan in view Fain and Ma. Therefore, element 1h would have been obvious to a POSITA in view of Avellan, Fain and Ma.

149. **With respect to Element 2,** The only “two way” control message referenced in the specification is the MPEG TS Control messages. Ex-1001 at 11:35-40 (“For example, the metadata added could be as simple as a string containing Artist, Name, or other information, or as complex as DCII Text (DigiCipher version 2, as specified by Motorola), MPEG TS Control messages (Two-way), or any other metadata or PID that can be inserted into the stream being sent to the multicast address and port.”).

150. Ma discloses the use of MPEG-TS (i.e., MPEG two way control messages) for interaction with the media stream. *see* Ex-1004 at [0050] (“The inline metadata insertion module 210 is responsible for inserting upcoming advertisement break notifications and exact advertisement start and end notification into the segments. ... There are multiple segment file formats (e.g., MPEG-TS, DASH, RTP, etc.)”); [0058] (“There are multiple segment file formats

(e.g., *MPEG-TS*, DASH, RTP, etc.)”). Ma further discloses inserting metadata (e.g., ID3 tags) into MPEG-TS segments and using this data for providing advertisements. Ex-1004 at [0038]-[0041]. For instance, Ma discloses that “the client 110 detects advertisement metadata by monitoring callbacks from the media player (e.g., receiving ID3 callbacks).” Ex-1004 at [0041]. Ma further discloses using metadata (e.g., ID3 callbacks) and DASH manifests to request content by the media player. Ex-1004 at [0038]-[0042]. Therefore, Ma discloses MPEG metadata that interacts with two way broadcast TV systems—i.e.—that the at least one media stream is interacted with MPEG two way control messages.

151. Indeed, the Examiner rejected this element in view of Ma during prosecution and the Applicant did not traverse that rejection. Ex-1002, 40.

152. A POSITA would have been motivated to combine Avellan with Ma and would have had a reasonable expectation of success doing so. 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 at 2:9-10. Ma is directed to performing “targeted advertisement replacement for near-real-time streaming media.” Ex-1004, [0001]. Hence, both Ma and Avellan are generally directed to providing web content in a media stream to subscribers. Further, Avellan discloses that the web page data may be compressed “into a *compressed digital video format* that can be sent to the user computer 104 for

display in the browser.” Ex-1003, 5:19-22. A POSITA would understand that MPEG is a compressed digital video format that was well known at the time and Ma explicitly discloses the use of MPEG. Therefore, a POSITA would have been motivated to combine the teachings of Ma with Avellan and modify Avellan to utilize Ma’s control messages in order to provide customized targeted content to a user which would provide content of most interest to that user. *see also* Ex-1002 at 40.

153. Fain as used in element 1[h] is directed to a non-overlapping claim element and does not affect the combination of Avellan and Ma. Moreover, as discussed in element [1h], a POSITA would have been motivated to combine Avellan with Fain and Ma. Therefore, element 2 would have been obvious to a POSITA in view of Avellan, Fain and Ma.

154. **With respect to Element 3**, Ma discloses using MPEG messages in a unicast mode. Specifically, Ma discloses “live stream processor 102 includes multiple components, including a live stream recorder 202 which records source audio/video content.” Ex-1004, [0044]. Ma adds that “[t]he live stream recorder 202 is responsible for attaching to the live feed using various protocols (e.g., unicast MPEG-TS, multi-cast MPEG-TS, unicast RTP, multi-cast RTP, HLS, DASH, RTMP, etc.).” Ex-1004, [0045].

155. For the same reasons discussed in element [2], a POSITA would have

been motivated to combine Avellan and Ma to implement the unicast MPEG messages of Ma in the unicast mode of Avellan because it would allow user control of media stream once playback starts.

156. Fain as used in element 1[h] is directed to a non-overlapping claim element and does not affect the combination of Avellan and Ma. Moreover, as discussed in element [1h], a POSITA would have been motivated to combine Avellan with Fain and Ma. Therefore, element 3 would have been obvious to a POSITA in view of Avellan, Fain and Ma.

157. **With respect to Element 4g**, Ma discloses this limitation. Specifically, Ma discloses a metadata insertion module that supports different file formats including MPEG-TS. *See* Ex-1004 at [0050] (“The inline metadata insertion module 210 is responsible for inserting upcoming advertisement break notifications and exact advertisement start and end notification into the segments. ... There are multiple segment file formats (e.g., MPEG-TS, DASH, RTP, etc.)”). Ma further discloses inserting metadata (e.g., ID3 tags) into MPEG-TS segments and using this data for providing advertisements. Ex-1004 at [0038]-[0041]. Ma further discloses inserting metadata (e.g., ID3 tags) into MPEG-TS segments and using this data for providing advertisements. Ex-1004 at [0038]-[0041].

158. The Examiner rejected this element in view of Ma during prosecution and Applicant did not traverse that rejection which further confirms that this

element would have been obvious in view of Ma. Ex-1002 at 40-41.

159. For the same reasons discussed in [2], a POSITA would have been motivated to combine Avellan and Ma to modify Avellan “to include the MPEG and metadata features of Ma for the advantages of providing targeted advertising replacement (Ma at [0041]) and utilizing a well-known standard that is interoperable with many devices.” Ex-1002 at 41. For instance, doing so would facilitate better conversion rate and more efficient add placement.

160. Fain as used in element 1[h] is directed to a non-overlapping claim element and does not affect the combination of Avellan and Ma. Moreover, as discussed in element [1h], a POSITA would have been motivated to combine Avellan with Fain and Ma. Therefore, element 4g would have been obvious to a POSITA in view of Avellan, Fain and Ma.

C. Ground 3: Claims 7-9 and 11-12 Are Anticipated by Wannamaker.

161. Based on the citations in the Petition and the accompanying explanations, it is my opinion that Wannamaker anticipates claims 7-9 and 11-12.

162. **With respect to Element 7a**, Wannamaker’s application server includes “the data carousel server for data formatting, and Multimedia Streamer (MMS) components for data transmission.” Ex-1006, [0169]. “The data carousel server creates objects in the Mediacast signaling protocol (MSP) format, and uses the multimedia streamer (MMS) components to transport the MSP objects to the

downstream network.” Ex-1006, [0174].

163. The application server 24 of Wannamaker which includes the data carousel server is a multicast server and includes the MMS components for data transmission. Ex-1006, [0169, 175, 181]. The out-of-band servers of the MMS can “multicast to a group of set-top boxes.” Ex-1006, [0229-0232]. Moreover, with respect to the operation of the microbrowser, Wannamaker discloses that “transcoded content is ... inserted into [a] multicast file system.” Ex-1006, [0490].

164. The application server 24 of Wannamaker is configured to generate parameters relating to at least one of video content, image content and audio content at the cache manager, at the data carousel as well as in conjunction with background images, a microbrowser, and size of assets when operating in the “layout preview mode.”

165. The cache manager sends a message to all cache managers on content processors hosts to resolve a URL. Ex-1006, [0236] (“When a process needs to fetch content, it requests the local cache manager to resolve the URL for the content.”); [0237] (If the content is not local, “the cache manager sends a message to all cache managers on content processor hosts that have been configured to resolve URL requests.”). The URL to be resolved may correspond to images, animated GIFs or other elements. Ex-1006, [0275] (“... Within the directory is the CPML file, the main FMB file containing rendered images, and one or more

subdirectories containing the rendered assets (*animated GIFs*, form elements) for the given CPML file.”). Therefore, this message from the cache manager on the application server 24 to the cache manager on the content processors 23 is a parameter relating to video content, image content, and/or audio content corresponding to the particular URL.

166. Additionally, the “[t]he data carousel server creates objects in the Mediacast signaling protocol (MSP) format.” Ex-1006, [0174]. The MPS objects are of different types and include “Directory Objects” which “form a list of resource locations, and can reference other directory objects, data objects, audio and video resources.” Ex-1006, [0187]. Accordingly, the MPS objects are parameters relating to at least one of video content, image content and audio content.

167. The application server also stores background graphics which are converted from JPEG into an MPEG I-frame allowing the set-top box to render them. Ex-1006, [0567] (“The invention also enables content developers to include aesthetically pleasing JPEG images into the background of an application. The I-frame can be a standard 24-bit JPEG file, which is stored on the application server and sent to the transcoder. The transcoder converts this JPEG file into an MPEG I-frame, allowing the set-top box to render it.”).

168. Wannamaker also discloses a “microbrowser for broadcast managed

content.” Ex-1006, [0009]. “The microbrowser displays and navigates HTML content that has been transcoded by the content processor and then broadcast via the Mediacast component” which as noted above (and shown in Fig. 3), is part of the application server 24. *Id.*, [0112]. For microbrowser rendering, the “information platform uses the thin client model to provide a Web browser on digital set-top boxes.” *Id.*, [0268]. The “server fetches content from the Web and performs the initial translation, layout, and rendering. The server caches the converted content for future reuse, and crawls the Web as configured by the server administrator to refresh the cached data.” *Id.*, [0270]. “The 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.” *Id.*, [0271].

169. Finally, Wannamaker discloses that the Mediacast server broadcasts “the size (in bytes) of each asset” produced by a page. Ex-1006, [0261] (In lay out preview mode “there is additional information displayed below the screen capture [including] the size (in bytes) of each asset, produced by this page, that are broadcast by the Mediacast server”). Accordingly, the size of each asset is another parameter that is generated relating to at least one of video content, image content and audio content on a page.

170. The application server of Wannamaker is configured to output the parameters via MPEG outputs. Specifically, the data carousel server includes the

MMS components for data transmission. Ex-1006, [0169]. The “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-1006, [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-1006, [0195].

171. **With respect to Element 7c**, the content processor 23 of Wannamaker is configured to receive and store parameters generated by the application server 24 as shown, for example, by the arrow between cache manager 40 and cache manager 37 in Figure 3. Wannamaker discloses receiving and storing the parameters on the cache server. Ex-1006, [0098]-[0099].

172. “Cache managers 37 (see FIG. 3) are responsible for accepting requests for content and handling the steps required to deliver the content to the necessary location.” Ex-1006, [0236]. As discussed with respect to [7a], “[t]o resolve the URL, the cache manager sends a message to all cache managers on content processor hosts that have been configured to resolve URL requests.” Ex-1006, [0237]. In response, “[t]he content processor cache managers all check their local caches for the requested URL and reply with the timestamps and status for their local source and rendered caches.” Ex-1006, [0237]. “The cache manager then implements information platform’s smart caching by evaluating the status of

all the caches and selecting one of the following mechanisms to best fulfill the application's request: If valid content resides in a rendered cache of one of the content processors, the cache manager immediately copies the content to the rendered caches[;] If the valid content is in a source cache, but not rendered, the cache manager first directs the cache manager on the content processor to render it and then copies the content to the rendered caches[; and] If the content is not in a source cache, the cache manager directs the least busy crawler to get the source and render it, and then copies the content to the rendered caches.” Ex-1006, [0238]-[0241].

173. Therefore, the cache managers of the content processor (“cache server”) receive the message (“parameter”) from the application server (multicast server). Moreover, it is inherent that the message would be stored in order to allow the content processor to resolve the requested URL because the system would not be operational otherwise.

174. Additionally, Wannamaker discloses that in the “layout preview mode” the renderer of the content processor receives “the size (in bytes) of each asset” produced by a page from the Mediacast server of the application server. Ex-1006 at [0261] (“The renderer also supports a layout preview mode that emulates a system running the microbrowser. ... In this mode, there is additional information displayed below the screen capture. It includes the size (in bytes) of each asset,

produced by this page, that are broadcast by the Mediacast server and whether the background I-frame is modified or not.”). Accordingly, the size of each asset is another parameter that is generated relating to at least one of video content, image content and audio content on a page and received by the caching server from the application server. Moreover, in this “layout preview mode”, this information is “displayed below the screen capture.” It is therefore stored on the display and it is inherent that “the size (in bytes) of each asset” is at least stored in corresponding video memory.

175. Finally, in one mode, the crawler of the content processor “only fetches the document if it is newer than the one on the application server, based on the modification dates provided by the Web server.” Ex-1006, [0254]. This further shows that the content processor inherently receives parameters generated by the application server (e.g., the modification date of the content) and stores them to make this comparison.

176. **With respect to Element 7f**, the application servers 24 of Wannamaker is provided with at least one of video content, image content and audio content for generating a multicast stream with MPEG encoded video and audio. As discussed in further detail below, Wannamaker discloses that “[t]he downstream communication, from server to set-top box delivers an MPEG transport stream containing MPEG video, MPEG audio, and data via a specialized

hardware multiplexer card.” Ex-1006, [0117].

177. As discussed in 7[a] of Petition, the application servers of Wannamaker generates a multicast stream.

178. Moreover, the application server of Wannamaker is provided with at least one of video content, image content, and audio content from the content processor for generating MPEG encoded video and audio at the Mediacast data carousel. Specifically, “the data carousel server creates objects in the Mediacast signaling protocol (MSP) format, and uses the multimedia streamer (MMS) components to transport the MSP objects to the downstream network.” Ex-1006, [0174]. The MPS objects “can reference other directory objects, data objects, audio and video resources.” *Id.*, [0187]. The 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.” *Id.*, [0193].

179. “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-1006, [0195]. The AVTS provides the following: Ability to play full motion video files; Ability to play MPEG I-frames (full-screen images); Ability to play MPEG B-frames (MPEG ‘layer’); Ability to play MPEG replacement P-frames (subscreen sized images); Ability to play MPEG motion vector P-frames.” *Id.*, [0196]-[0201]. The

MPEG Card (LMC) “is a PCI-based adapter card that is MPEG-2 transport stream compliant and can concurrently transmit and receive MPEG-2 transport streams.” *Id.*, [0210]. It is well known to a POSITA that MPEG-2 is a standard for coding moving pictures and associated audio information.

180. This element is also met by Wannamaker’s microbrowser feature. “The microbrowser displays and navigates HTML content that has been transcoded by the content processor and then broadcast via the Mediacast component” which as noted above (and shown in Fig. 3), is part of the application server 24. Ex-1006, [0112]. For microbrowser rendering, the “information platform uses the thin client model to provide a Web browser on digital set-top boxes.” *Id.*, [0268]. “The 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.” *Id.*, [0271]. It is well known to a POSITA that MPEG is a standard for coding moving pictures and associated audio information.

181. Wannamaker discloses that the renderer, which is part of the content processor, accepts URLs of HTML files that are stored locally and produces output image files (FMB) and outputs CPML or MML. Ex-1006, [0259] The HTML pages are translated to CPML and result in the production of an FMB file containing the MPEG compressed page information. *Id.*, [0263]. “All important page assets are described by using the CPML constructs such as anchors, form

elements, and animated GIFs.” *Id.*, [0263]. “The FMB file information is efficiently transcoded to one or more MPEG frames for transmission to digital set-top boxes.” *Id.*, [0264]. The MMS component of the applications servers transmits the MPEG audio and video to the set top boxes. *Id.*, [0169]; [0193]; Fig. 3.

182. Further, Wannamaker discloses that “[t]he digital set-top box already contains dedicated MPEG hardware for video and audio decoding, so it uses the same hardware to decode the MPEG data from the server.” Ex-1006, [0272].

183. **With respect to Element 7g**, Wannamaker discloses an “operator management interface” (OMI) that provides fault tolerance. Ex-1006, [0306]; [0320] (“The system is also capable of detecting fatal faults and restarting itself without human intervention. Much of the fault tolerance is configurable by the system operator”); [0101] (“Multiple servers can be replicated within the application server, forming one logical server. ... If a server fails, transactions are routed to another server in the server group.”); [0103] (“Fault tolerance is an important aspect of any online high-availability system. The information platform is configured to handle many types of system failures—both software and hardware. ... Note that the application server also includes the ability to load-balance between active servers so that, in addition to failover support, the servers in a cluster can be maximized for increasing overall performance. The network itself may also be configured with redundant network components, such as

duplicate switches and interface adapters. As a result of the multiple layers of redundancy, the total system presents very high availability to its users.”); [0579] (“Fault tolerance—three levels of fault tolerance are provided, namely critical hardware, subsystem redundancy, and software fault tolerance.”).

184. Accordingly, the fault tolerance features of the monitoring system of Wannamaker teach the claimed monitoring system configured to maintain generation of video and audio files, even in failure cases.

185. **With respect to Element 11**, Wannamaker discloses that the system generates audio MPEG files. Specifically, Wannamaker discloses that “[t]he downstream communication, from server to set-top box delivers an MPEG transport stream containing MPEG video, MPEG audio, and data via a specialized hardware multiplexer card.” Ex-1006, [0117]; *see also* [0193]; [0196]-[0201]. The MPEG Card (LMC) “is a PCI-based adapter card that is MPEG-2 transport stream compliant and can concurrently transmit and receive MPEG-2 transport streams.” Ex-1006, [0210]. It is well known to a POSITA that MPEG-2 is a standard that has been around since 1995 and includes a transport stream with video, audio and data streams. The MPEG-2 data stream is designed to carry meta data and program specific information. As discussed in further detail with respect to [7f], Wannamaker also discloses the generation of audio MPEG files with respect to the microbrowser feature.

186. Wannamaker also discloses that the system adds metadata in an MPEG frame. Ex-1006, [0271] (“The server continuously transmits the Web data to the client in an MPEG video stream. The server puts images of the rendered Web page in MPEG I-frames and MPEG P-frames. In addition, the server transmits some additional information about the Web page’s characteristics in an MPEG data stream. This additional information defines foreground text, hotzones, and hyperlink URLs. This is contained in an MML tile that is transcoded from the original HTML.”). Accordingly, a POSITA would understand that Wannamaker discloses adding metadata in an MPEG frame.

187. **With respect to Element 12**, as discussed with respect to [2], the only “two way” control message referenced in the specification is the MPEG TS Control messages. Ex-1001 at 11:35-40. A POSITA would understand that the “MPEG TS Control message” of the ’002 Patent refers to the MPEG Transport Stream. Just like the ’002 Patent, Wannamaker explicitly discloses the use of the MPEG Transport Stream. Ex-1006, [0117] (“The The downstream communication, from server to set-top box delivers an MPEG transport stream containing MPEG video, MPEG audio, and data via a specialized hardware multiplexer card.”); [0191] (“Private-text packets are then encapsulated into MPEG transport stream packets, and are carouseled by the MMS inband or out-of-band MPEG transport streams.”). Transport Streams inherently have Control Messages.

188. Moreover, Wannamaker discloses a “microbrowser rendering” feature where the “information platform uses the thin client model to provide a Web browser on digital set-top boxes that would otherwise be too slow.” Ex-1006, [0268]. The system operates as follows:

1. A server fetches content from the Web and performs the initial translation, layout, and rendering. ...
2. The server continuously transmits the Web data to the client in an MPEG video stream. The server puts images of the rendered Web page in MPEG I-frames and MPEG P-frames. In addition, the server transmits some additional information about the Web page's characteristics in an MPEG data stream. This additional information defines foreground text, hotzones, and hyperlink URLs. This is contained in an MML tile that is transcoded from the original HTML.
3. The digital set-top box already contains dedicated MPEG hardware for video and audio decoding, so it uses the same hardware to decode the MPEG data from the server. ...
4. The client software uses some of these freed-up CPU cycles to run a small but powerful microbrowser that interprets the contents of the MML tile. MML provides simple commands for drawing lines and text. In combination with the MPEG image data, MML lets the user navigate hypertext links.

189. Wannamaker further discloses that “[n]avigation is restricted to following the hyperlinks” and that a user can use the MPEG metadata to interact with the two way broadcast TV system. Ex-1006, [0278] (“Navigation is restricted to following the hyperlinks. The sites featured within the managed content have disabled the hot links that lead users off the site. Using managed content lets operators and their strategic partners present subscribers with a collection of valuable, aggregated Web sites specifically tailored and enhanced for television viewing. Direct URL entry from a wireless or virtual keyboard is not permitted, and the Internet is only checked for content updates on sites that are registered in the scheduler. This closed content environment offers promotional opportunities for the operator along with a means of generating revenue, as content providers and advertisers pay for exclusive access. All valid managed content is rendered to MPEG and MML format in the content processor cache, as required. The converted content is then posted to the Information Mediacast server for MPEG transmission and display on the user's set-top box.”); [0490] (“The microbrowser 194 (FIG. 9) is an LMAE application that can be used to view broadcast managed content that has been authored in HTML. ... When activated, the microbrowser reads and displays the home URL. These URLs can either be specified in the microbrowser's configuration file, or in an eTV trigger. The user

can then navigate the content in much the same manner as regular interactive HTML content. Selecting some links cause the microbrowser to read and display another page of managed content, while other links start an application such as a game.”). All of this navigation allows the user to “interact[] with [the] two way broadcast TV systems.”

D. Ground 4: Claim 10 Is Obvious in View of Wannamaker and Avellan.

190. Based on the citations in the Petition and the accompanying explanations, it is my opinion that Wannamaker in view of Avellan renders claim 10 obvious.

191. **With respect to Element 10**, as described with respect to elements [7f], Wannamaker discloses the use of MPEG. A POSITA would recognize that MPEG is a video coding standard used for encoding a video streaming format. Also, as described with respect to element 7[a], Wannamaker discloses generating a unicast stream noting that the out-of-band servers of the MMS can “single-cast or ‘addressed’ to a single set-top box.” Ex-1006, [0229-0232]. Further, as described with respect to [7d]/[7e], Wannamaker also discloses encoding of “animated GIFs” and sounds. *See, e.g., Id.*, [0098] (“The information platform supports content from standard Web sites, e.g. HTML source, GIF, animated GIF, JPEG, and PNG files. The majority of HTML 3.2 tags are supported, e.g. text, tables, forms, images, image maps, background images, and sounds.”). In light of

Wannamaker's disclosure, a POSITA would have found the encoding of video content to generate a unicast stream obvious.

192. Wannamaker in view of Avellan render this limitation obvious. Avellan discloses a unicast mode. Ex-1003, [Abstract] ("In the unicast mode, the user requests unicast data (e.g., less-popular websites or websites having highly user-customized information) at the browser. The gateway server images that one web page, compresses the unicast data, and transmits the compressed unicast data over the broadcast device substantially in real time to the one requesting user computer."); 7:53-58 ("Since the unicast mode is for customized information, the unicast data is sent in real time without delay, directly from the network could 150, 152 via the gateway platform 130 and the broadcast device 102 to the user computer 104, where it may be immediately displayed (once decompressed at the computer 104).").

193. Avellan discloses encoding video content from a website into a video streaming format in the unicast mode. Ex-1003, 4:56-67 ("... In addition, 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. The gateway server 134 then images those web pages (which are typically in an HTTP format) to a video or image frame format."); 5:5-15 ("In addition, web pages often have information which is

rendered over a period of time, such as a video, streaming information, or an animated display. ... Once 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.”); *see also* 7:58-60.

194. 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 at 2:9-10. Similarly, Wannamaker discloses a “middleware solution” referred to as an “information platform” which “provides a platform for cable system operators to deliver a full range of sophisticated new products to cable television subscribers.” Ex-1006 [Abstract]. Like Wannamaker, the Avellan system “replicates internet websites” and includes “a gateway platform having a gateway server and a cache.” Ex-1003, [Abstract]. Moreover, both Avellan and Wannamaker disclose processing a host of web content including images, animated images (including animated GIFs). Ex-1006, [0136]. Wannamaker also discloses using a temporal sequence with respect to such animated images. *See* [7d], [7e]. Moreover, both Avellan and Wannamaker disclose using a video streaming format (e.g., Ex-1003 at 5:19-22 and Ex-1006 at [0267]-[0273]) and generating a unicast stream (e.g., Ex-1003, 11:3-10 and Ex-1006, [0229-0232]). Therefore, this limitation would have been obvious to a POSITA in view of Wannamaker and Avellan because Wannamaker’s purpose is to allow user interaction so there must

be unicast support (vs. broadcast) to allow a specific user to request specific content be unicast only to that user. 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. Moreover, such a combination would not require an alteration to Wannamaker which already support unicast streaming of content.

IX. Materials Reviewed and Considered

195. 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 exhibits identified in the Table of Exhibits.

X. Conclusion

196. The Challenged Claims simply recite concepts known in the art at the time. Thus, the Challenged Claims were either anticipated or rendered obvious by

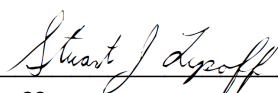
the prior art. Based on my experience, knowledge of the field at the relevant time, and a thorough analysis of prior art references, it is my expert opinion that the Challenged Claims of the '002 Patent are unpatentable

Declaration of S. Lipoff

IPR2025-00350

U.s. Patent 10,524,002

Executed on 20 December 2024, at Las Vegas, NV, USA.



Stuart Lipoff

Appendix A

Stuart J. Lipoff
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Las Vegas, NV 89109
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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

CLIENTS

ASSA	Kajeet
Caavo	Local Radio
Charles Schwab	Maxell
Comcast	Production Products Corp.
Contec	RIM
Dish	Roku
Frost Bank	Samsung
GE MDS	Sisvel MCP
Google LC	Unified Patents
HID Global	WSOU