

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

NETFLIX, INC.,

Petitioner,

v.

BROADCOM CORPORATION AND AVAGO TECHNOLOGIES
INTERNATIONAL SALES PTE. LIMITED,

Patent Owner.

Case No. IPR2021-00303

U.S. Patent 8,270,992

Declaration of Harley R. Myler, Ph.D.

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I, Harley R. Myler, declare as follows:

1. My name is Harley R. Myler. I am presently a professor in the electrical engineering department at Lamar University and have over 35 years of experience in digital media and video. I have prepared this declaration as an expert witness retained by Netflix, Inc. In this declaration I give my opinions as to whether certain claims of U.S. Patent No. 8,270,992 (“the ’992 patent”) are invalid. I provide technical bases for these opinions as appropriate.

2. This declaration contains statements of my opinions formed to date and the bases and reasons for those opinions. I may offer additional opinions based on further review of materials in this case, including opinions and/or testimony of other expert witnesses. I make this declaration based upon my own personal knowledge and, if called upon to testify, would testify competently to the matters contained herein.

I. THE ’992 PATENT

A. Overview

3. Entitled “Automatic quality of service based resource allocation,” the ’992 patent purports to “provide a system and method for allocating and utilizing resources in a dynamic communication network.” Ex.1001, 1:58-60. According to the ’992 patent, “[i]n a dynamic network environment,” such as in a wireless communication network, “various processing resources may freely enter and leave a network,” and these resources “may have superior or inferior service providing

capabilities to other resources already present in the dynamic network.” Ex 1001, 1:35-39. The patent provides an example of “a system providing relatively low quality audio service may enter a dynamic wireless network that includes one or more systems capable of providing a relatively high quality audio service.” *Id.*, 1:39-42. The former “system” may comprise a personal digital assistant (“PDA”) providing music to a user through a headset, and the latter “system” may comprise a desktop computer system in an office or home connected to expensive speakers. *Id.*, 1:42-45, 2:65-67, FIG. 5. As another an example from the patent, “a system entering a dynamic wireless network may have the capability to deliver relatively high quality video, email, or numerical processing capability to a user.” *Id.*, 1:42-45. The former “system” can be a network connected PDA, and the latter “system” can be a networked desktop computing station.

4. According to the patent, FIG. 5 of the ’992 patent “illustrates an exemplary network scenario 500 where the first system 510 comprises a personal digital assistant (‘PDA’) 515 initially providing music to a user through a headset 520 communicatively coupled to the PDA 515 through a communication link 525.” *Id.*, 3:25-30. The user and PDA 515 of the first system may “be mobile and may move within the boundaries of a wireless communication network of which the second system 550 is a member.” *Id.*, 3:66-4:2. In the example, a second system

550 comprises a desktop computing station 555. *See id.*, FIG. 5. FIG. 5 is reproduced below.

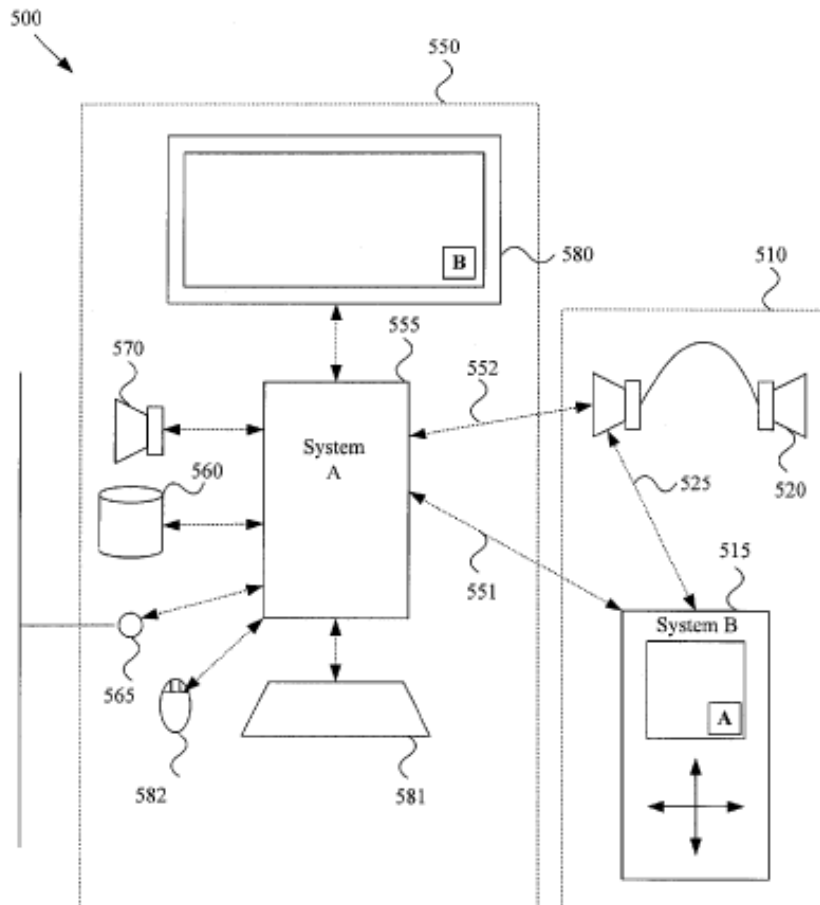


Figure 5

5. The '992 patent discloses that PDA 515 of first system 510 and desktop computer 555 of second system 550 may “communicat[e] information between the first and second systems of whether the first or second system has processing capability, which if utilized, would result in the current service being provided to the user at a higher level of quality than the current quality level.” *See id.*, 5:3-7.

6. According to the '992 patent, FIG. 1 illustrates a method for using resources in a dynamic wireless network environment for providing a higher quality of service to a user. *Id.* 3:3-6. The method comprises these steps: (step 120) a first system providing a service to a user; (steps 130 through 160) determining a second system is available to provide the user a higher quality service; (steps 180–190) using the second system to provide the user a higher quality level of service.

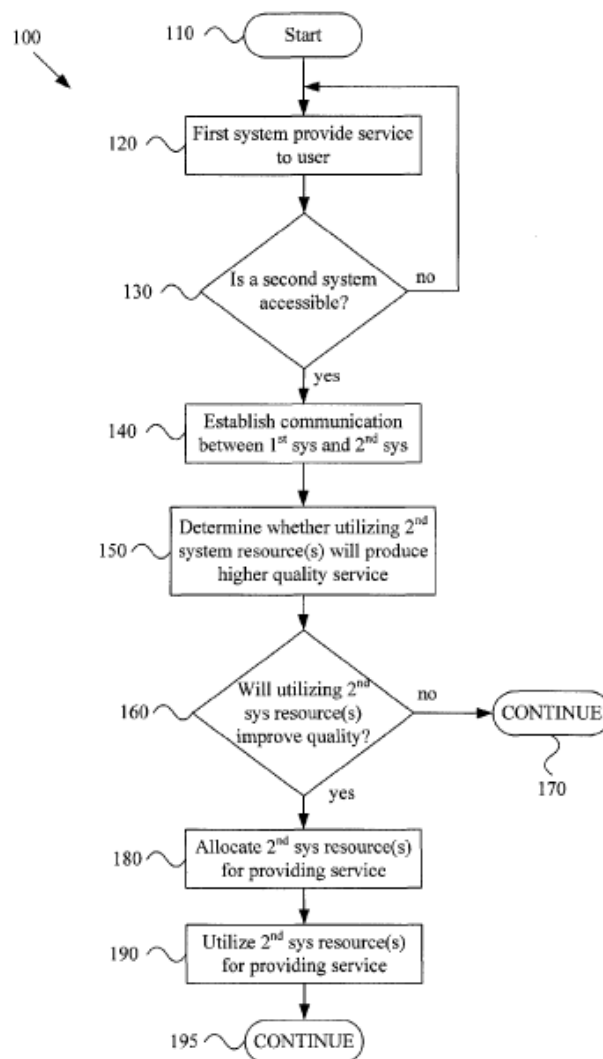


Figure 1

7. Although the patent specification states that the “particular provided service” is not limited to video/audio services, “email,” “numerical processing,” and “data processing,” the ’992 patent claims focus exclusively on providing a digital media service, such as video and/or audio services. *See id.*, 3:16-24, 1:42-45, claims 1-20.

B. Prosecution History

8. The ’992 patent claims benefit to a series of continuation applications: U.S. patent application Ser. No. 12/464,255, filed May 12, 2009, now U.S. Pat. No. 7,983,689, which is a continuation of U.S. patent application Ser. No. 11/689,995, filed Mar. 22, 2007, now U.S. Pat. No. 7,532,893, which is a continuation of U.S. patent application Ser. No. 10/875,891, filed Jun. 24, 2004, now U.S. Pat. No. 7,221,946, which is related to and claims priority from provisional patent application Ser. No. 60/504,876, filed Sep. 22, 2003. Ex. 1001, 000001.

9. On December 16, 2011, the Examiner rejected Claims 38-57 under 35 U.S.C. 103(a) as being unpatentable over Jagadeesan (US 2005/0059400) in view of Kayama (US Pub 20030017838). Ex 1002, 000064-000073.

10. On March 16, 2012, Applicants amended application claim 38 to recite the limitations: “determining that a network connection with a second system is available . . . ,” “using the network connection to obtain the digital media content at the higher quality level from the second system;” and “delivering the digital

media content at the higher quality level to the user instead of the digital media content at the current quality level.” *Id.* at 43.

11. Applicants attempted to distinguish the prior art by arguing that “as a whole, Jagadeesan fails to disclose or suggest obtaining voice data from **another source**, let alone obtaining digital media content **at a higher quality level from the second system**, as recited in claim 38.” *Id.* at 50 (emphasis added).

12. However, as will be presented below, obtaining digital media content at a higher quality level from the second system was already known.

C. Priority Date

13. For the purposes of my opinions set forth in this declaration, I have analyzed the grounds here under the September 22, 2003 priority date.

D. Challenged Claims

14. I understand that Petitioner is challenging the validity of claims 1-14 and 16-19 of the '992 patent in the Petition for Inter Partes Review to which this declaration will be attached. Those claims are reproduced in Appendix 3. While this Petition and declaration are directed to the challenged claims, I have considered all claims 1-20 of the '992 patent, as well as portions of the '992 patent prosecution history in forming my opinions.

II. SUMMARY OF THE PRIOR ART

15. There are a number of patents and publications that constitute prior art to the '992 patent. I have reviewed and considered the prior art discussed in this section, along with the materials listed in Appendix 2.

A. Invalidity Grounds

16. Based on my review and analysis of the materials cited herein, my opinions regarding the understanding of a person of ordinary skill in the art (POSITA) in the 2003 timeframe, and my training and experience, it is my opinion that the challenged claims of the '992 patent are invalid based on the following grounds:

Grounds	Claims	Statutory Basis	Prior Art
1	1-14 16-19	§ 103	Barnes and Shaw

17. I understand that none of the above-referenced art was cited or considered during prosecution of the '992 patent. First, none of these references or any related patents are listed on the face of the '992 patent. In addition, I have reviewed the file history for the '992 patent (Ex. 1002) and I am not aware of any of the above references being discussed in any office action or in the prosecution history generally.

18. Moreover, a POSITA would have understood that the Barnes and Shaw references are different from the references addressed during the prosecution of the '992 patent. In particular, the Examiner cited only two prior art references—U.S. Patent Application No. 2005/0059400 (“Jagadeesan”) in view of U.S. Patent Application No. 2003/0017838 (“Kayama”) as a basis for rejecting the claims at issue during prosecution. Ex. 1002 (Prosecution History), 000043, 000049-50 (non-final rejections dated March 16, 2012). Applicants overcame the Jagadeesan-based rejections by arguing that “Jagadeesan fails to disclose or suggest obtaining voice data from another source.” Ex. 1002 (Prosecution History), 000050. Applicants also argued that “Jagadeesan also necessary fails to teach, disclose, or suggest delivering the digital media content at the higher quality level to the user instead of the digital media content at the current quality level...” and that “Kayama, like Jagadeesan, relates to selection of a communication medium, and fails to disclose, teach, or suggest obtaining digital media content at a higher quality level from the second system.” *Id.*, 000050.

19. As discussed below, unlike Applicants’ arguments concerning Jagadeesan and Kayama, the combination of Barnes and Shaw does identify a new and better source (content server) based on Shaw’s express teachings on “the ability of the client player (namely, the code running in that player) to identify a ‘better’ source for a stream being received and to switch to that source ‘on the fly,’

i.e., while the stream is being received and rendered on the client.” Ex. 1005 (Shaw), 9:14-19. Therefore, unlike Applicants’ arguments concerning Jagadeesan and Kayama, the combination of Barnes and Shaw delivers the digital media content at a higher quality level to the user.

B. Overview of Barnes (Ex. 1004)

20. U.S. Patent Application Publication No. 2003/0065805 to Barnes is prior art under pre-AIA 35 U.S.C. § 102(a) because it published on April 3, 2003, which is before the earliest claimed priority date of the ’992 patent (September 22, 2003). Ex. 1004. I also understand that Barnes is prior art under pre-AIA § 102(e) as of its May 23, 2002 filing date.

21. Barnes teaches a multi-function communications device that combines the capabilities of a mobile phone and a personal digital assistant (PDA). *Id.* [0034]. The device is portable and may be handheld or worn around the neck, on the hip, or on the arm. *Id.* [0035]. The device includes a central processing unit, a processor, and memory. *Id.* The user interacts with the device through a variety of user input devices, such as a microphone (e.g., voice commands), touchpad, keyboard, buttons, or touchscreen. *Id.* [0036]. Output devices include a display (e.g., a high resolution color display with touch screen), a speaker, a headset jack, or a wireless headset. *Id.* [0037]-[0038]. FIG. 1 is a functional block diagram of Barnes’ invention:

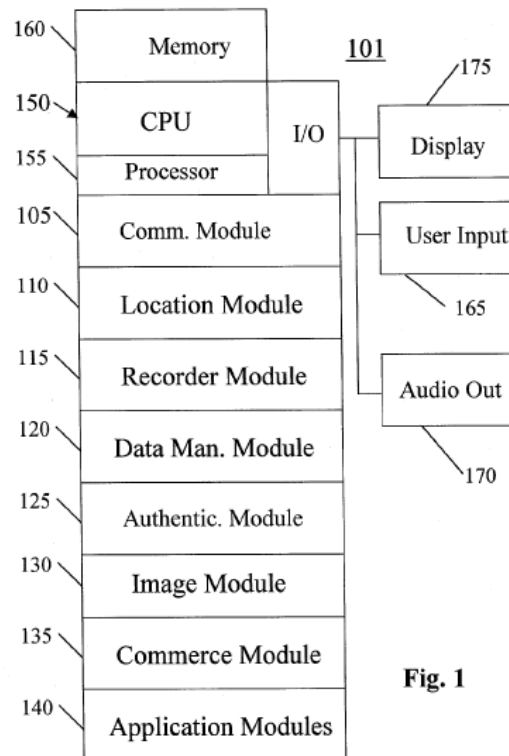


Fig. 1

22. The device is provided with applications, such as a web browser (e.g., Internet Explorer) and an audio/video player. *Id.* [0039]. The audio/video player supports well-known digital video compression standards (e.g., MPEG-1, MPEG-2, and MPEG-4), competing video compression schemes (e.g, Windows® Media, Indeo®, and QuickTime®), and well-known audio/video formats (e.g., .wav, .avi, .mov, .mpeg, .mp3, .au, and aiff files). *Id.* [0040]. Barnes teaches that the audio/media player could be a “RealPlayer Media Player®.” *Id.*

23. The device supports using a plurality of network connections, which allow the device to make phone calls and video phone calls, as well as receive Internet data, digital television signals, and digital radio signals. *Id.* [0044], [0066]. Examples of network connections include Bluetooth®, Wi-Fi, 802.11, 3G wireless,

and 2.5G wireless. *Id.* [0048], [0050-57]. For example, digital signals representing audio or video received over a wireless communication link can be processed and presented to the user by the audio/media player. *Id.* [0045].

24. Just as the '992 patent suggests redirecting music from a user's PDA headset to a better computer desktop speaker, Barnes' device "may also route certain data to remote devices during live or non-live presentation to the user" using a wireless connection in order to improve the quality of the presentation. *Id.* [0069]. For example, if the user's car has a better quality display, the device may route video signals to the car's display. *See id.* [0069] ("a video transmission or computer data (e.g., web pages) received by the device 101 may be routed (e.g., as requested by the user) to a remote display device (e.g., via a wireless PAN to a display in an automobile) that may be large or of better quality than the display of the device."). When listening to music, the device may route audio signals to the user's car stereo system. *See id.* Thus, the digital media content is delivered at a higher quality level to the user.

25. The device is programmed with rules for selecting a network connection from a plurality of available network connections to improve performance and quality of service. The selection may be based upon the available bandwidth of each network (i.e., the amount of data that can be communicated over a given time period), the anticipated bandwidth needed, the available capacity

of each network (i.e., how full to capacity a network is), the cost of each network, and other factors. *Id.* [0070]-[0071]. For example, if the user chooses to watch a movie, the device may select the connection with the highest bandwidth. *Id.* [0072]. As bandwidth increases, so does quality as higher data resolution is available in real time, thus delivering the digital media content at a higher quality level to the user.

26. Barnes also explains that device 101 includes programming for switching to a communication network when, network switching conditions arise. Network switching conditions may include one or more of:

- 1) changes in network conditions such as failure of a first network or the first network slowing down (due to high use such as multiple users and/or high levels of data being communicated), such as below a predetermined level (e.g., threshold speed), or increases in noise,
- 2) the user making a request, or attempting to make the request, to communicate data that is more suitable for communication through a second network (e.g., the user requesting a video file or movie),
- 3) the anticipated request of the user (e.g., based on the user starting a particular application such as a video player),
- 4) changes in network availability (e.g., a new network becoming available),

- 5) changes in conditions of the second network (e.g., more bandwidth or less noise),
- 6) the available capacity or relative available capacity (e.g., how full to capacity a network is),
- 7) the communication capabilities of the device, and
- 8) the historical (or anticipated) availability of bandwidth of network(s) (which may include, for example, use, volume, capacity, and/or speed data for days of the week or times of the day).

Id. [0074].

C. Overview of Shaw (Ex. 1005)

27. U.S. Patent No. 7,299,291 to Shaw is prior art under pre-AIA 35 U.S.C. § 102(e) because it was filed on May 17, 2001, which is before the earliest claimed priority date of the '992 patent (September 22, 2003).

28. Shaw is directed to a client media player and method for streaming live or recorded video and audio. Shaw explains that the important characteristic of streaming media is that the content can be played while it is still in the process of being downloaded. Ex. 1005, 1:17-19. In contrast, non-streaming media must be fully downloaded before it can be played, which may take minutes or even hours. *Id.*, 1:26-28. It was well-known to a POSITA that the quality of streaming media depends on the type of media being delivered (e.g., audio versus video), the speed

of the user's Internet connection (e.g., bandwidth), network conditions (e.g., congestion and packet loss), the bit rate at which the content is encoded, and the format (e.g., RealPlayer, Windows Media, or QuickTime). *See, id.*, 1:37-40.

29. Shaw teaches that the typical bandwidth constraints at the time meant that audio streaming could provide a quality of service at the level of FM quality (e.g., commercial broadcast radio), but that video streaming provided poorer quality (e.g., smaller screens, lower resolution, and fewer frames per second) as compared to TV standards (e.g., commercial broadcast TV). *See, id.*, 1:40-44. One way content owners sought to provide a better quality of service was to encode streaming media at multiple bit rates. By doing so, the content could be streamed to a user with a slower connection using a lower bit rate encoding, while the same content could be streamed to a user with a faster connection using a higher bit rate encoding. *Id.*, 1:54-58.

30. To provide a better streaming experience, Shaw teaches a client-side method for identifying an optimum server for obtaining streaming content. The player performs a query to identify a set of servers from which the desired stream may be obtained. *Id.*, Abs., 3:48-58. The player may then perform one or more tests to determine which of the "servers provides a best quality of service for the stream." *Id.*, Abs., 3:58-61. The player then uses that server to retrieve the stream. *Id.*, Abs., 3:61-62. Because the best server for a stream may change over time, the

player periodically performs the same query process to determine whether there is a better source for the stream. *Id.*, 3:32-44, Abs., 3:62-66. If yes, the player switches to the better source for the stream if that will maintain or enhance the quality of service for the stream. *Id.*, Abs., 3:64-66. Thus, Shaw teaches providing media content at a higher quality level and from another source. Shaw further teaches that then existing media players, including Real Player, can be enhanced to perform its invention. *Id.*, 7:4-25.

III. LEVEL OF ORDINARY SKILL IN THE ART

31. In determining the characteristics of a hypothetical person of ordinary skill in the art (“POSITA”) of the ’992 patent at the time of the claimed invention, I considered several things, including various prior art techniques relating to wireless communications and mobile multimedia applications, the type of problems that such applications gave rise to, and the complexity of the solutions required. I also considered the sophistication of the technologies involved, and the educational background and experience of those actively working in the field at the time. I also considered the level of education that would be necessary to understand the ’992 patent. Finally, I placed myself back in the relevant period of time and considered the researchers, engineers, and programmers that I have worked with, managed, or taught in the field of digital multimedia communications and systems, including multimedia streaming.

32. I came to the conclusion that a person of ordinary skill in the field of art of the '992 patent would have been a person with a bachelor's degree in computer science, computer engineering, electrical engineering, or a similar field with at least two years of experience in multimedia communications and systems, or a person with a master's degree in computer science, computer engineering, electrical engineering or a similar field with a specialization in multimedia communications and systems. A person with less education but more relevant practical experience may also meet this standard.

33. In view of the types of problems encountered in the art and prior art solutions to those problems, including the adoption of mobile video streaming, a POSITA in 2003 with the level of skill described above would have had the knowledge and skills necessary to:

- Design/implement video streaming systems and applications using wired or wireless networks;
- Understand how to perform client-based network selection and switching in a wireless communication system supporting multimedia streaming;
- Understand how to perform client-based server selection and switching in a multimedia delivery network;

- Understand dynamic techniques for overcoming bandwidth limitations in mobile video streaming;
- Understand how to implement mobile video bit rate adaption; and
- Understand mobile video compression and techniques for improving the quality of streaming media in bandwidth limited connections.

IV. CLAIM CONSTRUCTION

34. My understanding of claim construction is set forth in Appendix 4. In this Section, I provide my opinions that relate to matters of claim construction.

A. “A Portable System”

35. I understand that the Petitioner contends that the preambles of the challenged claims are limiting. Claims 1-5 and 11-14 are directed to a method for providing a digital media service to a user in “a portable system” and claims 6-10 and 16-19 are directed to “a portable system” for providing a digital media service. Therefore, in forming my opinions, I have assumed that the preambles are claim limitations and explain how the preambles are addressed by the prior art.

36. It is my opinion that “a portable system” is an essential structure to the challenged claims. For example, claim 1 requires, in part, “determining that a network connection with a second system is available” and “using the network connection to obtain the digital media content.” A network connection presupposes that there are at least two systems to form a network connection, and in claim 1

there are only two systems that can possibly be connected: the portable system and the second system. If the portable system is not a limitation, then it is my opinion that a POSITA would not have understood what is required by the claim because the claim recites “determining that a network connection with a second system is available” but the claim (in the circumstance where the portable system is not a limitation) provides no guidance as to what connects with the second system.

V. INVALIDITY

37. In this Section, I explain more fully the facts and opinions that have led me to the conclusion that the challenged claims are invalid in view of the grounds identified in Section II.A. My opinions are based on my review and analysis of the materials cited herein, my opinions regarding the understanding and knowledge of a POSITA in the 2003 timeframe, and my own training and experience.

A. Ground 1: Claims 1-14 and 16-19 Are Obvious Based on Barnes in View of Shaw

38. Based on my review and analysis of the materials cited herein, my opinions regarding the understanding of a POSITA before September 2003, and my training and experience, it is my opinion that a POSITA would have found claims 1-14 and 16-19 are rendered obvious by the combination of Barnes’ portable device with a media player and Shaw’s teachings for identifying an optimum server source of streaming content. The combination would have

included a portable device as taught by Barnes that combines the capabilities of a mobile phone and a personal digital assistant (PDA), and includes a central processing unit, memory, one or more network connections, and a streaming media player. The media player of the combination is improved according to Shaw's teachings of a client-side method for identifying an optimum server for obtaining streaming content. A POSITA would have been motivated to make the combination for several reasons.

39. Both Barnes and Shaw teach using a media player to deliver streaming media content to a user. Shaw teaches that the best server from which to obtain a stream may change over time and that it would be advantageous for the media player to identify the best server dynamically and switch from one server to another when appropriate. Ex. 1005, 3:32-44. Shaw teaches implementing his inventive method for identifying an optimum server to obtain streaming content as a software enhancement to then-existing media client players, such as the well-known RealPlayer. *Id.*, 7:4-25. Just as Barnes teaches switching to a network with a higher bandwidth or better condition network (see Ex. 1004, [0070-74]), Shaw teaches that the client player can identify a "better" source for a stream and to switch that source "on the fly" while the stream is being received and provided to the client to provide a better quality of service (*see* Ex. 1005, Abs., 3:50-66, 6:57-7:3, 9:14-20; 10:18-34). Thus, the combination of Barnes and Shaw involves using

a known technique (Shaw's teachings on how to improve the operation of a media player such as a RealPlayer) to improve a similar device (Barnes' teaching of a portable device that includes a media player such as a RealPlayer).

40. To find a better server, Shaw teaches that "the player may then optionally perform one or more tests to determine which of a set of servers provides a best quality of service for the stream." Ex. 1005, Abs., 3:58-64, 8:6-10. Like Barnes (*see* Ex. 1004, [0071-74]), Shaw suggests that the "best" server can be selected based on bandwidth. For example, Shaw teaches that "[s]treaming media quality varies widely according to the type of media being delivered, the speed of the user's Internet connection, network conditions" (Ex. 1005, 1:37-40) and bandwidth constraints (*id.*, 1:40-44). A POSITA would have found it obvious to use Barnes' bandwidth test (selecting a better network based on higher bandwidth) (Ex. 1004, [0071-74]) as one of the tests used by Shaw to selecting a better server. Barnes' bandwidth test is a known technique that can be readily applied as improvement to Shaw's player, as both Barnes and Shaw contains media player, to yield predictable results (e.g., selecting better servers with a high communication bandwidth).

41. In addition, the prior art references themselves suggest the proposed combination because Barnes teaches including a media player, such as a RealPlayer, on its portable device (Ex. 1004, [0039-0040]), and Shaw teaches that

his inventive method improves the operation of media player and may be implemented as a software enhancement to a media player such as a RealPlayer (Ex. 1005, 7:4-25).

42. A POSITA would have had a reasonable expectation of success in combining the teachings of Barnes and Shaw because Barnes suggests using a RealPlayer as its media player, and Shaw expressly teaches that his invention may be applied to a RealPlayer. Ex. 1005, 7:4-25.

1. Independent Claims 1, 6

43. Claim 1 is directed to a method, and claim 6 is directed to a system that performs the method. The claims recite limitations that are near verbatim: (i) delivering (deliver) digital media content having a current quality level to a user (the “Delivering Limitation”); (ii) determining (determine) a second system is available to provide the digital media content to the user at a higher quality level (the “Determining Limitation”); (iii) using (use) the network connection to obtain the digital media content at the higher quality and delivering (deliver) the digital media content at the higher quality level to the user (the “Using Limitation”).

44. I have placed the language of claims 1 and 6 from the '992 patent side-by-side in the following chart to show that the claims are substantially the same, except that claim 6 further requires that the claimed system have “at least one component operable” to perform for the same method limitations of claim 1:

1[a]. <i>In</i> a portable system, <i>a method</i> for providing a digital media service to a user, the <i>method</i> comprising:	6[a]. A portable system for providing a digital media service to a user, the <i>portable system</i> comprising: <i>at least one component operable to, at least:</i>
[1b] <i>delivering</i> digital media content having a current quality level to a user;	[6b] <i>deliver</i> digital media content having a current quality level to a user;
[1c] <i>determining</i> that a network connection with a second system is available and is characterized by a communication bandwidth that is high enough to provide the digital media content to the user at a quality level higher than the current quality level;	[6c] <i>determine</i> that a network connection with a second system is available and is characterized by a communication bandwidth that is high enough to provide the digital media content to the user at a quality level higher than the current quality level;
[1d] <i>using</i> the network connection to obtain the digital media content at the higher quality level from the second system; and <i>delivering</i> the digital media content at the higher quality level to the user instead of the digital media content at the current quality level.	[6d] <i>use</i> the network connection to obtain the digital media content at the higher quality level from the second system; and <i>deliver</i> the digital media content at the higher quality level to the user instead of the digital media content at the current quality level.

45. Because the substantive limitations of claims 1 and 6 are the same (limitations [b]-[d]), I have addressed those limitations together.

46. As explained below, it is my opinion that a POSITA would have found that the limitations of claims 1 and 6 are rendered obvious by the combination of Barnes and Shaw.

Preambles

- 1[a]. In a portable system, a method for providing a digital media service to a user, the method comprising:**
- 6[a]. A portable system for providing a digital media service to a user, the portable system comprising: at least one component operable to, at least:**

47. It is my opinion that the combination of Barnes and Shaw renders the preambles obvious because Barnes teaches a portable device (i.e., system) containing a processor, memory, and a communications module that is used to provide a digital media service to the user.

48. A POSITA would have found it obvious to make the combination of Barnes and Shaw a portable system for several reasons. *First*, Barnes' device is a combination of devices that are themselves portable—a mobile phone and a personal digital assistant (PDA):

The present invention is a multi-function communications device 101 that includes conventional mobile phone and personal digital assistant (PDA) capabilities and preferably one or more of the functional modules shown in FIG. 1

Ex. 1004, [0034].

49. Barnes explains that it is preferable for the device to be “a portable device” that is “preferably handheld, but may also be worn around the neck, on the

hip, attached to the arm of the user, or carried in any convenient manner.” *Id.* [0035].

50. *Second*, Barnes teaches using its device with wireless connections, which further suggests a portable device:

Preferably the device 101 is configured to operate with a conventional mobile telephone network or wireless wide area network (WWAN), and one or more other wireless local area networks (wireless LAN or WLAN), wireless Metropolitan Area Networks (MAN), and a wireless personal area networks (PAN) (e.g., a Bluetooth® network).

Id. [0044].

51. In addition to describing the use of Bluetooth® and Wi-Fi with the device, Barnes also teaches that its portable device communicates with a third generation (3G) network, such as some or all of the IMT-2000 or Universal Mobile Telecommunication System (UMTS). *Id.* [0048], [0055-57]. The 3G standards include CDMA-2000 based services (e.g., CDMA 1XRTT, CDMA 2000 1XEV) (CDMA refers to Code-Division Multiple Access), and Wideband CDMA. *Id.* [0057].

52. A POSITA would have found it obvious to use the combination of Barnes and Shaw to provide a digital media service to a user because Barnes and Shaw each teaches providing a digital media service to a user.

53. *First*, Barnes teaches including an audio/video player on the device. *Id.* [0039]. Barnes states that the audio/video player is preferably a “RealPlayer Media Player®,” which a POSITA would have known is used to stream a digital media service to a user because it was a well-known and commercially successful digital media product. Barnes further teaches that the audio/video player may support a wide variety of audio and video formats. *Id.* [0040]. Supported formats include one or more MPEG standards, such as MPEG-4, MPEG-2, MPEG-1, and MP3; and other competing formats, such as Video for Windows®, Indeo®, and QuickTime®. Suggested supported file formats include wav, .avi, .mov, .mpeg, .mp3, .au, and aiff files. *Id.* A POSITA would have known that all of the suggested formats are used to provide a digital media service to a user because all they were well-known audio and video formats used for that purpose.

54. *Second*, Barnes gives several examples of its device being used to provide a digital media service to the device’s user. For example, Barnes teaches using the device’s wireless communication links for receiving audio and video media, such as videotelephone calls, video camera data, and voice calls, as well as television and radio transmissions, which are in turn presented to the device’s user:

Thus, the contemporaneous wireless communication links of the present invention permits the user to participate in a conversation via a voice communication link (e.g., via a 3G, 2.5G, or 2G network) while simultaneously using a data communication link (e.g., via

WLAN, PAN, 3G, 2.5G, or 2G network) to receive or send emails, transmit and receive data via the Internet, download audio or video files, upload and download data, or otherwise transmit and/or receive data. Thus, *the user can also receive and transmit live audio/visual data—such as live video transmissions (e.g., a video telephone call, receive a television transmission, transmit video camera data), and live audio transmissions (e.g., a telephone call, receive radio transmission, transmit voice data)*—while also transmitting and receiving computer data such as emails, word processing files, spreadsheet files, application files, and data to remote computer systems (e.g., such as a web page from a web server) and non-live audio/visual data (previously stored audio data and video data). While the actual reception and transmission of the bits comprising the multiple transmissions may not occur “simultaneously” from a technical perspective, the data from *the multiple transmissions is presented to the user and received from the user in the same time periods (or overlapping time periods), which is herein referred to as contemporaneous transmission and/or reception.*

Id. [0066].

55. As another example, Barnes explains that the device may receive digitized radio or television signals through a wireless communication link that are processed and presented to the user by the audio/video player (e.g., the RealPlayer Media Player®):

In addition, the device 101 may also includes [sic] software and hardware for receiving AM, FM and televisions signals. Such analog

signals are preferably converted to digital signals at the source, or at an intermediate system, and transmitted to the device 101 as a digital signal through a wireless communication link. At reception, the signals are processed and presented to the user (e.g., via RealPlayer Media Player®) as is well known to those skilled in the art. Thus, the device 101 includes software for formatting, processing, and providing a representation of the signal to the display for presentation to the user.

Id. [0045].

56. *Third*, Shaw teaches using a client player to provide a digital media service to a user.

The present invention provides a method for enabling a client player to identify a best server dynamically and, in addition, to selectively switch to that server to receive the stream or portions thereof. In one embodiment, the present invention is implemented [sic] a streaming media client or player, which may be a plug-in to a web browser. The streaming media client is receiving a media stream from a given server, as generally described above.

Ex. 1005, 6:57-65, *see also id.*, 7:4-25, Abs. A POSITA would have understood Shaw teaches presenting a digital media service to a user because it was well-known that a streaming media client is the component of a streaming solution that receives the digital media stream and renders it for viewing by the user.

57. Finally, a POSITA would have found it obvious that the combination of Barnes and Shaw includes “at least one component operable to” perform the

limitations of claim 6. Barnes teaches providing a central processing unit (including a processor and memory) along with software implementing an operating system and various software modules. Ex. 1004, [0035]. Barnes teaches that one of the modules is the above mentioned audio/video player (e.g., the RealPlayer Media Player). *Id.* [0039]. A POSITA would have found it obvious that the proposed combination's audio/media player as improved by Shaw's teachings would similarly be provided as instructions stored on the portable device's memory and executed by the central processing unit because that is basic manner in which all software is provided to modern computing devices.

Delivering Limitations

[1b] delivering digital media content having a current quality level to a user;

[6b] deliver digital media content having a current quality level to a user;

58. It is my opinion that the combination of Barnes and Shaw renders the "Delivering Limitations" obvious based on Shaw's teachings.

59. As explained for the [a] limitations above, Shaw teaches using a client player to provide a digital media service to a user. *See supra* ¶¶56-57, 28-30. A POSITA would have known that a streaming media client (such as a RealPlayer) delivers digital media content to a user because that was the known function for a streaming media client. Shaw observes that "streaming media clients are often

called players...”, and “playing” is another way of referring to the delivery of digital media content to a user. Ex. 1005, 2:2-4.

60. Shaw teaches a client player for identifying an optimum server for obtaining a stream. Ex. 1005, Title (“Client-side method for identifying an optimum server”), Abs. *First*, the client player performs a query, called “DNS SRV,” to identify a set of one or more servers from which a stream can be obtained:

A client machine includes a media player provisioned to perform a query to a CDNSP nameserver having a network map of Internet traffic conditions. In a preferred embodiment, the query is a DNS SRV lookup and includes an identification of the client player. The query is made asking for a particular service (e.g., RTSP) via a particular protocol (TCP) in a particular CDNSP domain. In response, the nameserver returns a set of one or more tokens, with each token defining a machine or, in the preferred embodiment, a group of machines, from which the player should seek to obtain given content (e.g., a stream).

Id., 3:49-58 (summary of the invention) and Abs. Shaw describes this process in further detail with reference to FIG. 3 (*see id.*, 7:26-7:49 and 7:63-8:5) and FIG. 4 (*see id.*, 10:4-13) (corresponding to steps 400 and 402).

61. *Second*, after obtaining a set of potential sources for the stream from the “DNS SRV” query, the client player performs tests to determine which server

is the best server for obtaining the stream and then uses the best server to retrieve the stream:

The player may then optionally perform one or more tests to determine which one of a set of returned servers provides a best quality of service for the content delivery. That server is then used to retrieve the content.

Id., 3:58-62 and Abs. In connection with FIG. 3, Shaw describes a method of testing each server to determine which is the “fastest” respond, and deems the “fastest” server to be the best server for the stream:

Returning to FIG. 3, the server testing process 306 responds to the returned token information or to information obtained from further processing of the token (as in the “y5q” example described above), and may perform one or more tests to help identify a best server. Server testing is not required, however, although it is desirable provided the additional bandwidth required by the testing is not prohibitive. In an illustrative embodiment, the server testing process has been provided with a list of servers to test. It then contacts each one, e.g., by using the SRV protocol, which specifies a well-defined ordering scheme, although the player can use any scheme or simply try all servers at level n before trying $n+1$. Upon contacting a server, the process issues a status request to get information about the capabilities of the server. One convenient technique is to use an RTSP “OPTIONS” command. The response from each server will be a static text string. The request-response is timed by the server testing

process, which then determines the “best” server (e.g., usually the one providing the fastest response).

Ex. 1005, 8:6-25; 10:13-15 (corresponding to step 404).

62. The process is summarized in the flow chart shown in FIG. 4:

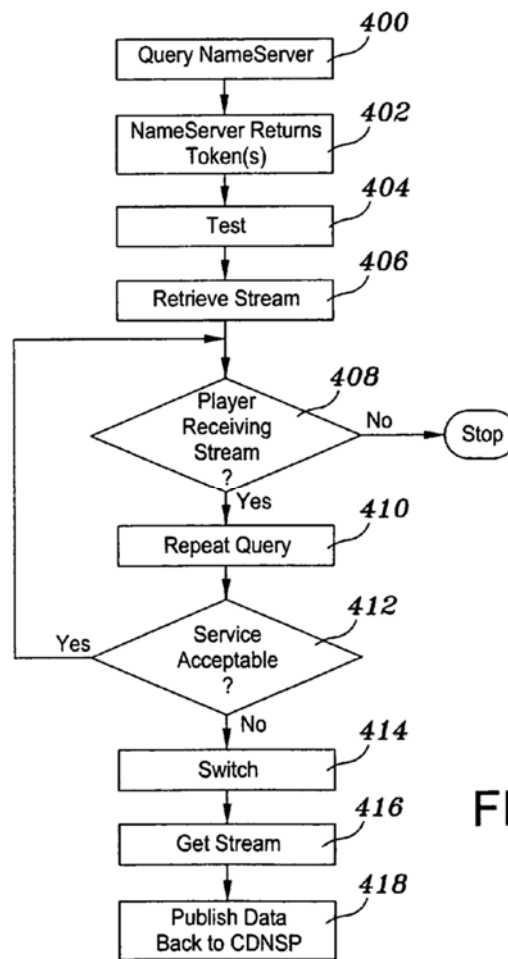


FIG. 4

63. A POSITA would have understood that a stream selected in this manner teaches delivering digital media content having a current quality level because a stream is a representation of digital media content, and it was well-known that a given stream has a particular quality level that is dependent upon a number of factors. Specifically, Shaw teaches that “[s]treaming media quality

varies widely according to the type of media being delivered, the speed of the user's Internet connection, network conditions, the bit rate at which the content is encoded, and the format used." *Id.*, 1:37-40. In other words, the quality of the stream depends upon parameters used to encode the stream as well as the conditions when the stream is being retrieved and delivered.

64. For example, Shaw also teaches that insufficient bandwidth leads to poor streaming video, including lower resolution and few frames per second. *See id.*, 1:40-44 ("In general, streaming audio can be FM quality, but, given typical bandwidth constraints, streaming video is poor by TV standards, with smaller screens, lower resolution, and fewer frames per second.").

65. In addition, Shaw teaches that it was common to encode streaming media at different bits so that a user with a lower bandwidth connection can access the stream (albeit at a lower quality), while a user with a higher bandwidth connection can access a higher quality version of the stream:

Content owners typically choose to *encode media at multiple rates* so that users with *fast connections get as good an experience as possible* but users with slow connections can also access the content.

Ex. 1005, 1:54-58. Thus, a POSITA would have understood that the quality level of streaming media content varies according to the encoding format, encoding bit rate, and the connection speed between the media player client and the source server. Furthermore, a POSITA would have found it obvious that a connection

with higher available bandwidth supports high speed (fast) connections and streams encoded at higher encoding rates.

Determining Limitations

- [1c] determining that a network connection with a second system is available and is characterized by a communication bandwidth that is high enough to provide the digital media content to the user at a quality level higher than the current quality level;**
- [6c] determine that a network connection with a second system is available and is characterized by a communication bandwidth that is high enough to provide the digital media content to the user at a quality level higher than the current quality level;**

66. It is my opinion that the combination of Barnes and Shaw renders the “Determining Limitations” obvious based on Shaw’s teachings.

67. My analysis for the “Delivering” limitations above explains how Shaw’s client media player selects a server source for a stream to be played or streamed to the user. Shaw also teaches the “Determining” limitations because Shaw teaches periodically determining whether there is a better source for the stream (i.e., the second system):

Periodically, the client player code repeats the DNS SRV query during playback to determine whether there is a better source for the stream. If so, the player is controlled to switch to the better stream source “on the fly” if appropriate to maintain and/or enhance the quality of service.

Ex. 1005, 3:62-66, Abs, 10:16-26. In other words, Shaw teaches that the client player periodically performs the same process of identifying a set of servers from which a stream can be obtained, and performing a test to determine if one of the servers is available to provide the stream at a better quality level (i.e., the second system).

68. When repeating the same process for identifying the (then best) source for the stream, Shaw explains that the client player may also consider additional factors, such as the cost of switching mid-stream, and whether the current source is providing an acceptable stream:

Another function provided by the present invention is the ability of the client player ... to identify a “better” source for a stream being received and to switch to that source “on the fly,” i.e., while the stream is being received and rendered on the client. The decision process 308 is used to determine whether the player should switch servers mid-stream. Because it is likely there will be some cost to switching (e.g., perhaps a short interruption in service), a client should only switch servers if it is not getting an acceptable stream from the first server. The decision process 308 makes a decision regarding whether the stream being received is “acceptable,” e.g., a stream that is not currently being thinned by the server, or some other metric. As used herein, “acceptable” does not necessarily mean acceptable quality. It can also mean acceptable from a stream management point of view.

Ex. 1005, 9:14-29.

69. A POSITA would have understood that repeating the “DNS SRV” query teaches “determining that a network connection with a second system is available” because the “DNS SRV” lookup identifies servers that the client may connect to in order to obtain the stream at a higher quality level. Each of the servers identified by the process (other than the currently used server) can be the claimed second system. A POSITA would have found it obvious that there is a separate network connection between the client player and each of the servers identified by the repeated query process because a client must establish a separate connection with each server to communicate.

70. A POSITA would have found it obvious to determine the communication bandwidth between the client media player and each server identified by the “DNS SRV” query in order to determine whether that server can “provide the digital media content to the user at a quality level higher than the current quality level” for several reasons.

71. *First*, Shaw teaches that the purpose of performing the test is to determine whether there is a “better” source for the current stream. A POSITA would have found it obvious to determine whether the connection between the client and the potential second system has a higher communication bandwidth

because Shaw teaches that the communication bandwidth between the client and stream source affects stream quality. *See supra* ¶¶63-65 (citing Ex. 1005, 1:37-58).

72. *Second*, Shaw teaches that a stream is unacceptable if the stream is being “thinned.” Ex. 1005, 9:24-27 (“The decision process 308 makes a decision regarding whether the stream being received is ‘acceptable,’ e.g., a stream that is not currently being thinned by the server...”). This decision process is used to decide whether the client player should switch servers mid-stream. *Id.*, 9:19-24. A POSITA would have known that “thinning” a stream refers to dropping portions of a stream from transmission at its source so that the client can keep up with the stream. In other words, when a server detects that there is insufficient communication bandwidth between the server and the client, the server may “thin” the stream by dropping information (e.g., frames) from the stream so that the client can keep up. Because thinning is a technique for handling a drop in communication bandwidth, a POSITA would have found it obvious to choose a different source for the stream if there is a higher bandwidth connection between the client and alternate source because it would avoid the need for thinning the stream and therefore provide the stream at a higher quality level. Therefore, Shaw suggests determining the communication bandwidth of the connection between the media player and each source server to pick a better source.

73. To the extent Patent Owner argues that Shaw does not sufficiently suggest determining the communication bandwidth of the network connection between the client media player and the servers identified by the “DNS SRV” query, using a bandwidth test would have been an obvious improvement based upon Barnes’ teachings. *First*, Barnes suggests determining the communication bandwidth of a network connection because it describes choosing between network connections based on their available bandwidth:

[W]hen communications with the desired external system may be accomplished by more than one network, the device 101 must determine the available network with which to establish the communication(s)

In this example, the determination of the available network with which to establish one more communications is based on one or more of the available bandwidth of each available network (i.e., the amount of data that can be communicated over a given time period), the anticipated bandwidth necessary, the available capacity or relative available capacity (e.g., how full to capacity a network is), the historical (or anticipated) availability of bandwidth (which may include, for example, use, volume, capacity, and/or speed data for days of the week or times of the day), the communication capabilities of the device, the amount of data to be transmitted, and the cost of using each network (e.g., connection time, per amount of data transmitted).

Ex. 1004, [0070-71].

74. Barnes also teaches choosing a connection with the higher communication bandwidth for use with video streaming because streaming a video requires relatively high communication bandwidth:

For example, if the available WLAN network has a maximum speed of 50K/sec, an available 3G network will likely have greater available bandwidth. If the user desires to download and watch a movie (which may determined [sic] by a user input in response to a prompt or by the user opening an audio/video player for external retrieval of the video file), relatively high bandwidth can be anticipated as being needed. Since the WLAN does not provide enough bandwidth to receive the communication (e.g., movie data file) in a desired manner without buffering, the higher speed network is selected.

Ex. 1004, [0072]. A POSITA would have found it obvious that Barnes' device would have had to determine the bandwidth of each connection in order to know how to choose between connections based on their available communication bandwidths.

75. *Second*, like Shaw, Barnes teaches that it is advantageous to switch network connections when Barnes' device detects that the current network connection has slowed down below a certain speed or the device detects that a second network connection has more bandwidth available:

Thus, when network switching conditions arise, the device 101 establishes a communication with the external device via a second network and preferably terminates the communication established

through the first network. Network switching conditions may include one or more of 1) changes in network conditions such as failure of a first network or the *first network slowing down* (due to high use such as multiple users and/or high levels of data being communicated), *such as below a predetermined level* (e.g., threshold speed), or increases in noise, 2) the user making a request, or attempting to make the request, to communicate data that is more suitable for communication through a second network (e.g., the user requesting a video file or movie), 3) the anticipated request of the user (e.g., based on the user starting a particular application such as a video player), 4) changes in network availability (e.g., a new network becoming available), 5) *changes in conditions of the second network (e.g., more bandwidth or less noise)*, 6) the available capacity or relative available capacity (e.g., how full to capacity a network is), 7) the communication capabilities of the device, and 8) the historical (or anticipated) availability of bandwidth of network(s) (which may include, for example, use, volume, capacity, and/or speed data for days of the week or times of the day).

Ex. 1004, [0074]. A POSITA would have understood that Barnes' device would have had to determine the communication bandwidth of a network connection in order to make a decision to switch when a connection falls below a threshold speed.

76. Finally, Barnes teaches determining the communication bandwidth of a network connection by requesting bandwidth data when the device requests to communicate with a network. *See* Ex. 1004, [0073].

77. A POSITA would have found it obvious to apply Barnes’ bandwidth test to Shaw’s selection of the best server because both Barnes and Shaw suggest that high communication bandwidth contributes to delivering high quality media services (*see supra* ¶¶63-65; *see also* Ex. 1004, [0072]), and Shaw expressly teaches making use of other tests (like Barnes’ bandwidth test) in its method of finding the best server (Ex. 1005, 8:6-13, 10:13-15).

Using Limitations

[1d] using the network connection to obtain the digital media content at the higher quality level from the second system; and delivering the digital media content at the higher quality level to the user instead of the digital media content at the current quality level.

[6d] use the network connection to obtain the digital media content at the higher quality level from the second system; and deliver the digital media content at the higher quality level to the user instead of the digital media content at the current quality level.

78. It is my opinion that the combination of Barnes and Shaw renders the “Using Limitations” obvious based on Shaw’s and Barnes’ teachings.

79. A POSITA would have understood that Shaw contemplates using the network connection to obtain the digital media content at the higher quality level from the second system. For example, Shaw teaches “the ‘best’ [server] can

change very quickly given the relatively large size of most streams (and the near-infinite size of all live streams). Thus, in many cases, the ‘best’ server for a given client player receiving a given stream is likely to change before the stream is finished.” Ex. 1005, 3:33-39. Shaw further teaches that “[i]t would be desirable to enable a client player to identify a best server dynamically and, when appropriate, to enable the player to selectively switch from one server to another during the process of downloading and outputting a given stream or other large file.” Ex. 1005, 3:40-44.

80. Shaw reinforces this teaching by declaring that “[a]nother function provided by the present invention is the ability of the client player (namely, the code running in that player) to identify a ‘better’ source for a stream being received and to switch to that source ‘on the fly,’ i.e., while the stream is being received and rendered on the client.” Ex. 1005, 9:14-19; *see also id.*, 9:37-40 (“If the decision process determines that another server is a better source than a current source, control is passed to the stream switch process 310, which is the process that makes the actual switch from one server to another.”). As described for the Determining Limitations [1c] and [6c], Shaw teaches that one reason to switch to a different server is that the currently obtained stream is being “thinned” and therefore provides unacceptable quality. Ex. 1005, 9:24-27. Because thinning is a technique for handling a drop in communication bandwidth, a POSITA would have found it

obvious to switch to a different source for the stream if there is a higher bandwidth connection between the client and alternate source because it would avoid the need for thinning the stream and therefore provide the stream at a higher quality level. *See, id.*, 1:37-40 and 1:47-58 (describing well-known practice of encoding streams at multiple bits so that higher quality streams can be provided to users with faster connections and lower quality streams can be provided to users with slower connections). Thus, a POSITA would have found it obvious from this teaching in Shaw that switching to a better source provides a higher quality level than the current quality level. *See also* Ex. 1005, Abs. (“If a better source exists, the player performs a switch to the better stream...if appropriate to maintain and/or enhance the quality of service.”), 3:64-66.

81. Additionally, Shaw teaches switching to the second server to obtain the streaming media without any interruption to the media service because Shaw explains that “the stream switch process includes the capability to match data packets from first and second servers to enable a substantially seamless switch to the new stream source.” *Id.*, 9:63-66.

82. Based on Shaw’s teachings above, a POSITA would have found it obvious that the purpose of the seamless switch is to use the new and better stream source to continue delivery of the digital media content to the user at the higher

quality level without any break or interruption. Therefore, Shaw's teachings render the Using Limitation obvious.

83. To the extent Patent Owner argues that Shaw does not teach this limitation, it is my opinion that Barnes also teaches using the network connection to obtain the digital media content at the higher quality level from the second system because Barnes teaches a client device that switches from a first network to a second network if a second network has higher bandwidth when network switching conditions arise, "the device 101 establishes a communication with the external device via a second network and preferably terminates the communication established through the first network." Ex. 1004, [0074]. A POSITA would have found it obvious that a client device that is rendering digital media content to a user but switches from a first network to a second available network due to changed network conditions would then use the second network to obtain media content after the switch and continue to deliver media content to the user.

2. Independent Claims 11, 16

84. Claim 11 is directed to a method, and claim 16 is directed to a system that performs the method. I have placed the language of claims 11 and 16 side-by-side in the following chart to show that the two claims are substantially the same, except that claim 16 further requires that the claimed system have "at least one component operable" to perform for the same method limitations of claim 11:

11[a]. <i>In</i> a portable system, <i>a method</i> for providing a digital media service to a user, the <i>method</i> comprising:	16[a]. A portable system for providing a digital media service to a user, the <i>portable system</i> comprising: <i>at least one component operable to, at least:</i>
[11b] <i>delivering</i> digital media content having a current quality level to a user;	[16b] <i>deliver</i> digital media content having a current quality level to a user;
[11c] <i>communicating</i> with a second system regarding communication bandwidth of a network connection with the second system;	[16c] <i>communicate</i> with a second system regarding communication bandwidth of a network connection with the second system;
[11d] <i>determining</i> , based at least in part on said communicating, that the network connection is available and characterized by at least a minimum determined communication bandwidth;	[16d] <i>determine</i> , based at least in part on said communicating, that the network connection is available and characterized by at least a minimum determined communication bandwidth;
[11e] in response to at least said determining, <i>utilizing</i> the network connection to receive the digital media content at a quality level higher than the current quality level; and <i>delivering</i> the digital media content at the higher quality level to the user instead of the digital media content at the current quality level.	[16e] in response to at least said determining, <i>utilize</i> the network connection to receive the digital media content at a quality level higher than the current quality level; and <i>deliver</i> the digital media content at the higher quality level to the user instead of the digital media content at the current quality level.

85. Because the substantive limitations of claims 11 and 16 are the same (limitations [b]-[e]), I have addressed those claims together.

86. As explained below, it is my opinion that the limitations of claims 11 and 16 are rendered obvious by the combination of Barnes and Shaw.

Preambles

11[a]. In a portable system, a method for providing a digital media service to a user, the method comprising:

16[a]. A portable system for providing a digital media service to a user, the portable system comprising: at least one component operable to, at least:

87. It is my opinion that the combination of Barnes and Shaw teaches a method and a portable system for providing a digital media service to a user based on Barnes' portable device and Shaw's media player.

88. As explained in my opinion with respect to preambles 1[a] and 6[a], which are identical to preambles 11[a] and 16[a], respectively, the combination of Barnes and Shaw renders the preambles obvious because Barnes teaches a portable device (i.e., system) providing a central processing unit (including a processor and memory) along with software implementing an operating system and various software modules, including an audio/media player as improved by Shaw's teachings, for providing a digital media service to a user, including performing the limitations of claim 16. *See supra* ¶¶47-57.

Delivering Limitations

[11b] delivering digital media content having a current quality level to a user;

[16b] deliver digital media content having a current quality level to a user;

89. It is my opinion that the combination of Barnes and Shaw renders the “Delivering Limitations” [11b] and [16b] obvious based on Shaw’s media player teachings.

90. Limitation [11b] is identical to limitation [1b], and limitation [16b] is identical to limitation [6b]. As explained in my opinion above with respect to 1[b] and 6[b], Shaw teaches delivering digital media content having a current quality level to a user using a media player, such as a RealPlayer. *See supra* ¶¶58-65.

Communicating Limitations

[11c] communicating with a second system regarding communication bandwidth of a network connection with the second system;

[16c] communicate with a second system regarding communication bandwidth of a network connection with the second system;

91. It is my opinion that the combination of Barnes and Shaw renders the “Communicating Limitations” [11c] and [16c] obvious based on Shaw’s and Barnes’ teachings.

92. *First*, a POSITA would have found these limitations are obvious because Shaw teaches using a media player that implements the Real Time Streaming Protocol, and a POSITA would have understood that the Real Time

Streaming Protocol provides for communicating bandwidth information to the streaming server.

93. Shaw explains that media players (including RealPlayer) use the Real Time Streaming Protocol (RTSP) to deliver streaming media:

To deliver the media in real time Real [Player] and QuickTime use RTSP, the Real Time Streaming Protocol. RTSP is an application-level protocol designed to work with lower-level protocols like RTP (Realtime Transport Protocol) and RSVP (Resource Reservation Protocol) to provide a complete streaming service over the Internet.

Ex. 1005, 2:14-19. Shaw describes its media player's use of RTSP in several ways. For example, the DNS SRV query identifies servers available to provide service using RTSP:

A client machine includes a media player provisioned to perform a query to a CDNSP nameserver having a network map of Internet traffic conditions. In a preferred embodiment, the query is a DNS SRV lookup and includes an identification of the client player. *The query is made asking for a particular service (e.g., RTSP)* via a particular protocol (TCP) in a particular CDNSP domain.

Id., 3:48-54 (emphasis added); *see also id.*, 7:39-41, Abs. Other examples are Shaw's description of using RTSP's OPTIONS and DESCRIBE commands to test servers. *See id.*, 8:13-31. Thus, a POSITA would have understood that Shaw teaches using a media player that implements RTSP.

94. A POSITA would have found it obvious that a media player according to Shaw's teachings communicates with a second system regarding communication bandwidth of a network connection with the second system because Shaw's media player implements RTSP and RTSP provides for sending an indication of the client's available bandwidth in the header of a request sent to a server (i.e., second system):

The Bandwidth request header field describes the estimated bandwidth available to the client, expressed as a positive integer and measured in bits per second. *The bandwidth available to the client may change during an RTSP session*, e.g., due to modem retraining.

Ex. 1006, 46 and 44 (describing header field definitions). A POSITA would have understood that this teaches a communication with a second system because the bandwidth request header is a data field included in an request sent from the RTSP client to the RTSP server. And, a POSITA would have found it obvious that the bandwidth available to the client included in the request is the client's estimate of the communication bandwidth available between the RTSP client and the RTSP server because the bandwidth of the connection between the client and the server is what limits the ability to reproduce a stream in real-time. In other words, if the bandwidth is too low, then the client cannot receive data from the server to reproduce the stream in real-time, which leads to the pause in playback caused by buffering that is familiar to users of streaming media.

95. It is my opinion that a POSITA would have been knowledgeable of the features of the Real Time Streaming Protocol and would have known how to implement the standard. A POSITA would have known that Real Time Streaming Protocol (RTSP) refers to a standard issued by the Internet Engineering Task Force (IETF) designated RFC2326. For example, a patent application filed on January 19, 2001 (and directed to a video content transmitting system and method) identified “RTSP (Real Time Streaming Protocol (RFC2326))” as an IETF standard that is relevant to multimedia communications over networks. *See* Ex. 1008, [0002]-[0003]. The IETF is a well-known standards body because it has issued a number of influential standards, such as the Hypertext Transfer Protocol (HTTP). A POSITA would have also known that IETF standards are available from the IETF website at www.ietf.org. *See, e.g.*, Ex. 1009 (international patent application published on March 23, 2000 noting that the Real Time Streaming Protocol is published as RFC 2326 and available from ietf.org). Ex. 1006 is a copy of RTSP protocol (RFC2326) published on the IETF’s website. It was also well-known in the industry that a published RFC never changes and any errors in an RFC is corrected by the issuance of a separate errata. *See* <https://www.ietf.org/standards/rfcs/>.

96. *Second*, a POSITA would have found that this limitation is suggested by Shaw’s teachings relating to multi-rate stream encoding. As described above

(*see supra* ¶¶65, 29), it was common for content owners to encode streaming media at multiple encoding bit rates so that users with faster connections can receive a higher-quality stream (i.e., a stream encoded at a higher bit rate), while users with slower connections can still receive the stream albeit at a lower-quality level (i.e., a stream encoded at a lower bit rate). Ex. 1005, 1:37-40, 1:47-58. A POSITA would have understood from this teaching that it is advantageous for the streaming client to inform the streaming server of the communication bandwidth of the network connection between the streaming client and streaming server so that the streaming server can choose the encoding with the highest encoding bit rate that can be delivered in real-time given the available bandwidth.

97. Finally, to the extent Patent Owner argues that Shaw does not sufficiently teach communicating with a second system regarding the communication bandwidth of the server connection, it would have been an obvious improvement based on Barnes' teachings of determining and communicating the bandwidth of a network connection. Barnes teaches that a client can determine the communication bandwidth of a network connection (such as to an available network) by requesting communication and establishing communication with the available network:

Prior to communicating with the external system, the device 101 preferably transmits a request for communication via the various networks with which the device 101 is designed to communicate. In

addition, communications with some networks (e.g., always on networks) may already be established. Thus, the determination of the available networks with which to establish the desired communication, and *information relating to it (e.g., bandwidth data), can be established during the requested communication.*

Ex. 1004, [0073] (emphasis added).

98. Given that Barnes' portable device determines the communication bandwidth of the second system (available network) "during the requested communication" (Ex. 1004, [0073]), a POSITA would have found it obvious that the portable and the second system communicate regarding the bandwidth of the connection.

Determining Limitations

[11d] determining, based at least in part on said communicating, that the network connection is available and characterized by at least a minimum determined communication bandwidth;

[16d] determine, based at least in part on said communicating, that the network connection is available and characterized by at least a minimum determined communication bandwidth;

99. It is my opinion that the combination of Barnes and Shaw renders limitations [11d] and [16d] obvious based upon Shaw's and Barnes' teachings.

100. As explained above, the "Delivering Limitations" of claims 1, 6, 11, and 16 are substantively the same, and rendered obvious based on Shaw's teachings. *See supra* ¶¶58-65, 90. In my analysis of the "Delivering Limitations," I

explain how Shaw teaches identifying an optimum server for obtaining a stream. Ex. 1005, Title (“Client-side method for identifying an optimum server”), Abs. *First*, the client player performs a “DNS SRV” query to identify a set of one or more servers from which a stream can be obtained. *Id.*, 3:49-58 (summary of the invention) and Abs. Shaw describes this process in further detail with reference to FIG. 3 (*see id.*, 7:26-7:49 and 7:63-8:5) and FIG. 4 (*see id.*, 10:4-13) (corresponding to steps 400 and 402). *Second*, after obtaining a set of potential sources for the stream from the “DNS SRV” query, the client player performs tests to determine which server is the best server for obtaining the stream and then uses the best server to retrieve the stream. *Id.*, 3:58-62, 8:6-13, 10:13-15, Abs.

101. In connection with FIG. 3, Shaw describes a method of testing each server that involves sending a Real Time Streaming Protocol request to each of the servers:

Returning to FIG. 3, the server testing process 306 responds to the returned token information or to information obtained from further processing of the token (as in the “y5q” example described above), and may perform one or more tests to help identify a best server. Server testing is not required, however, although it is desirable provided the additional bandwidth required by the testing is not prohibitive. In an illustrative embodiment, the server testing process has been provided with a list of servers to test. It then contacts each one, e.g., by using the SRV protocol, which specifies a well-defined

ordering scheme, although the player can use any scheme or simply try all servers at level n before trying $n+1$. ***Upon contacting a server, the process issues a status request to get information about the capabilities of the server. One convenient technique is to use an RTSP “OPTIONS” command.*** The response from each server will be a static text string. The request-response is timed by the server testing process, which then determines the “best” server (e.g., usually the one providing the fastest response).

Ex. 1005, 8:6-25, *see also id.*, 10:13-15. The responses received from the servers are used to determine the “best” server for the stream. *Id.*

102. A POSITA would have found that the Determining Limitations are rendered obvious by modifying Shaw’s testing step by communicating with each tested server regarding the communication bandwidth of the network connection between the media player and the tested server as described for the Communicating Limitations [11c] and [16c]. As explained for Communication Limitations [11c] and [16c], it would have been obvious to communicate bandwidth information based upon Shaw’s teaching of a media player that uses Real Time Streaming Protocol (RTSP) because RTSP provides for sending the client available bandwidth information in the header to a RTSP request (*see supra* ¶¶91-96), and Barnes’ teaching of including bandwidth information in a request for communications (*see supra* ¶¶97-98). A POSITA would have been motivated to modify Shaw’s testing process in this manner and have had a reasonable

expectation of its success because Shaw teaches that the testing step is not limited to the example given, but that any suitable test for determining the “best” server may be used. Ex. 1005, 8:6-28, 3:58-61 (“The player may then optionally perform one or more tests to determine which one of a set of returned servers provides a best quality of service for the content delivery.”). A bandwidth test would have been obvious given a POSITA’s knowledge that the bandwidth of the connection between a streaming client and streaming server is an important determinant in the quality level of the stream. *See* Ex. 1005, 1:37-58.

103. Finally, a POSITA would have found it obvious to determine whether the available network connection is characterized by at least a minimum determined communication bandwidth for several reasons. As described before, a POSITA would have known that there is a relationship between connection bandwidth and stream quality (as described in Shaw’s background). Ex. 1005, 1:37-58. Shaw teaches that one reason to switch from one server to another is when the client detects that the stream is being thinned, which occurs where there is insufficient bandwidth between the client and server. Ex. 1005, 9:21-27; *see also supra* ¶72 (describing thinning). Shaw’s teaches that a client should switch servers only when the improvement will outweigh the cost of switching suggests determining a minimum bandwidth necessary to provide an improvement over the existing connection because otherwise the client would switch servers whenever

there is a connection with any improvement in communication bandwidth, which could worsen the streaming experience if the client has pauses or gaps in streaming due to the switching without the new source providing some amount of improved quality to offset the switching cost.

104. Further, to the extent Patent Owner argues that Shaw does not sufficiently teach the second system has a communication bandwidth above a minimum predetermined bandwidth, it is my opinion that Barnes teaches this limitation because Barnes teaches determining whether an network is available for a media connection based on different types of bandwidth information, including the anticipated bandwidth necessary:

In this example, the determination of the available network with which to establish one more communications is based on one or more of the available bandwidth of each available network (i.e., the amount of data that can be communicated over a given time period), *the anticipated bandwidth necessary*, the available capacity or relative available capacity (e.g., how full to capacity a network is), the historical (or anticipated) availability of bandwidth (which may include, for example, use, volume, capacity, and/or speed data for days of the week or times of the day), the communication capabilities of the device, the amount of data to be transmitted, and the cost of using each network (e.g., connection time, per amount of data transmitted).

Ex. 1004, [0071]. A POSITA would have found it obvious that an “anticipated bandwidth necessary” suggests a “minimum determined” bandwidth because “anticipated *bandwidth necessary*” concerns how much bandwidth is expected or required for a given stream, for example, for downloading and watching a movie. Thus, a POSITA would have understood that “anticipated *bandwidth necessary*” suggests an expected minimum bandwidth required for providing service.

Utilizing Limitations

- [11e] in response to at least said determining, utilizing the network connection to receive the digital media content at a quality level higher than the current quality level; and delivering the digital media content at the higher quality level to the user instead of the digital media content at the current quality level.**
- [16e] in response to at least said determining, utilize the network connection to receive the digital media content at a quality level higher than the current quality level; and deliver the digital media content at the higher quality level to the user instead of the digital media content at the current quality level.**

105. It is my opinion that the combination of Barnes and Shaw renders the “Utilizing Limitations” obvious based on Shaw’s and Barnes’ teachings.

106. As explained in my opinion above with respect to claim limitations [11d] and [16d], Shaw teaches a client player that determines mid-stream when a second server is available and is a better source because it has a communication bandwidth that is above a minimum determined bandwidth (the “Determining Limitations”).

107. A POSITA would have understood that Shaw contemplates utilizing the determined network connection to receive and deliver the digital media content at a quality level higher than the current quality level from the second system. For example, Shaw teaches “the ‘best’ [server] can change very quickly given the relatively large size of most streams (and the near-infinite size of all live streams). Thus, in many cases, the ‘best’ server for a given client player receiving a given stream is likely to change before the stream is finished.” Ex. 1005, 3:33-39. Shaw further teaches that “[i]t would be desirable to enable a client player to identify a best server dynamically and, when appropriate, to enable the player to selectively switch from one server to another during the process of downloading and outputting a given stream or other large file.” Ex. 1005, 3:40-44.

108. Shaw reinforces this teaching by declaring that “[a]nother function provided by the present invention is the ability of the client player (namely, the code running in that player) to identify a ‘better’ source for a stream being received and to switch to that source ‘on the fly,’ i.e., while the stream is being received and rendered on the client.” Ex. 1005, 9:14-19; *see also id.*, 9:37-40 (“If the decision process determines that another server is a better source than a current source, control is passed to the stream switch process 310, which is the process that makes the actual switch from one server to another.”). Shaw teaches that one reason to switch to a different server is that the currently obtained stream is being “thinned”

and therefore provides unacceptable quality. Ex. 1005, 9:24-27. Because thinning is a technique for handling a drop in communication bandwidth, a POSITA would have found it obvious to switch to a different source for the stream if there is a higher bandwidth connection between the client and alternate source because it would avoid the need for thinning the stream and therefore provide the stream at a higher quality level. *See, id.*, 1:37-40 and 1:47-58 (describing well-known practice of encoding streams at multiple bits so that higher quality streams can be provided to users with faster connections and lower quality streams can be provided to users with slower connections). Thus, a POSITA would have found it obvious from this teaching in Shaw that switching to a better source provides a higher quality level than the current quality level. *See also* Ex. 1005, Abs. (“If a better source exists, the player performs a switch to the better stream...if appropriate to maintain and/or enhance the quality of service.”), 3:64-66.

109. Additionally, Shaw teaches switching to the second server to receive the streaming media without any interruption to the media service because Shaw explains that “the stream switch process includes the capability to match data packets from first and second servers to enable a substantially seamless switch to the new stream source.” *Id.*, 9:63-66.

110. Based on Shaw’s teachings above, a POSITA would have found it obvious that the purpose of the seamless switch is to use the new and better stream

source to continue delivery of the digital media content to the user at the higher quality level without any break or interruption. Therefore, Shaw's teachings render the Utilizing Limitation obvious.

111. To the extent Patent Owner argues that Shaw does not teach this limitation, it is my opinion that Barnes also teaches utilizing the network connection to receive the digital media content at a quality level higher than the current quality level from the second system because Barnes teaches a client device that switches from a first network to a second network if a second network has higher bandwidth when network switching conditions arise, "the device 101 establishes a communication with the external device via a second network and preferably terminates the communication established through the first network." Ex. 1004, [0074]. A POSITA would have found it obvious that a client device that is rendering digital media content to a user but switches from a first network to a second available network due to changed network conditions would then use the second network to receive media content after the switch and continue to deliver media content to the user.

3. Dependent Claims 2, 7, 12, 17

- 2. The method of claim 1, where the digital media content is video media.
- 7. The portable system of claim 6, where the digital media content is video media.
- 12. The method of claim 11 where the digital media content is video media.
- 17. The portable system of claim 16, where the digital media content is video media.

112. Claims 2, 7, 12, and 17 depend from claims 1, 6, 11, and 16, respectively. It is my opinion that the combination of Barnes and Shaw renders the additional limitations of these claims obvious.

113. As described above, the claims 1, 6, 11, and 16 are rendered obvious by the combination of Barnes' portable device having a media player and Shaw's teachings for identifying an optimum server source of streaming content. *See supra* ¶¶38-42. A POSITA would have understood that the combination renders claims 2, 7, 12, and 17 obvious because Barnes teaches that the media player is used to deliver digital media content that is video media, and Shaw also suggests delivering digital media content that is video media to a user.

114. *First*, Barnes teaches including an *audio/video player* on the device. Ex. 1004, [0039]. Barnes states that the audio/video player is preferably a "RealPlayer Media Player®," which a POSITA would have known is used to stream digital media, including video media, to a user because it was a well-known

and commercially successful digital media product. Barnes further teaches that the audio/video player may support a wide variety of audio and video formats. *Id.* [0040]. Supported video formats include one or more MPEG standards, such as MPEG-4, MPEG-2, and MPEG-1; and other competing video formats, such as Video for Windows®, Indeo®, and QuickTime®. *Id.* In addition, Barnes suggests that the audio/video player support several file formats that are well-known video formats: .avi, .mov, and .mpeg files. *Id.* A POSITA would have recognized that these suggested formats are used to provide digital media content that is video media to a user.

115. In addition, Barnes gives several examples of its device being used to provide a video media to the device's user. For example, Barnes teaches using the device's wireless communication links for video media, such as video telephone calls, video camera data, and television. Ex. 1004, [0066], [0045].

116. *Second*, Shaw teaches using a client player to identify the best server for obtaining a stream. Ex. 1005, 6:57-65. Shaw teaches that streaming media can include video media encoded from sources such as VHS or Beta format tapes, MPEG video, and AVI formats, which were all well-known video media. *Id.* 1:44-47. And, Shaw teaches that its invention may be implemented as an enhancement to a streaming client player such as a RealPlayer, which was a well-known streaming client used to deliver digital media content that is video media. *Id.*, 7:4-

25, 2:7-11 (describing how the major streaming formats (RealSystem G2, Microsoft Windows Media, and Apple QuickTime) support all media types including audio and video).

4. Dependent Claims 3, 8, 13, 18

- 3. The method of claim 1, where the digital media content is audio media.**
- 8. The portable system of claim 6, where the digital media content is audio media.**
- 13. The method of claim 11, where the digital media content is audio media.**
- 18. The portable system of claim 16, where the digital media content is audio media.**

117. Claims 3, 8, 13, and 18 depend from claims 1, 6, 11, and 16, respectively. It is my opinion that the combination of Barnes and Shaw renders the additional limitations of these claims obvious.

118. As describe above, the claims 1, 6, 11, and 16 are rendered obvious by the combination of Barnes' portable device having a media player and Shaw's teachings for identifying an optimum server source of streaming content. *See supra* ¶¶38-42. A POSITA would have understood that the combination renders claims 2, 7, 12, and 17 obvious because Barnes teaches that the media player is used to deliver digital media content that is audio media, and Shaw also suggests delivering digital media content that is audio media to a user.

119. *First*, Barnes teaches including an **audio/video player** on the device. Ex. 1004, [0039]. Barnes states that the audio/video player is preferably a “RealPlayer Media Player®,” which a POSITA would have known is used to stream digital media, including audio media, to a user because it was a well-known and commercially successful digital media product. Barnes further teaches that the audio/video player may support a wide variety of audio and video formats. *Id.* [0040]. Barnes suggests that the audio/video player support several file formats that are well-known audio media formats: wav, .mp3, .au, and .aiff files. *Id.* A POSITA would have recognized that these suggested formats are used to provide digital media content that is audio media to a user.

120. In addition, Barnes gives several examples of its device being used to provide a video media to the device’s user. For example, Barnes teaches using the device’s wireless communication links for audio media, such voice telephone calls and radio. Ex. 1004, [0066], [0045].

121. *Second*, Shaw teaches using a client player to identify the best server for obtaining a stream. Ex. 1005, 6:57-65. Shaw teaches that streaming media can include audio media encoded from sources such as MP3 audio and AVI formats, which were all well-known audio media. *Id.* 1:44-47. And, Shaw teaches that its invention may be implemented as an enhancement to a streaming client player such as a RealPlayer, which was a well-known streaming client used to deliver

digital media content that is audio media. *Id.*, 7:4-25, 2:7-11 (describing how the major streaming formats (RealSystem G2, Microsoft Windows Media, and Apple QuickTime) support all media types including audio and video).

5. Dependent Claims 4, 9

- 4. The method of claim 1, wherein said determining comprises communicating information of the communication bandwidth with the second system.**
- 9. The portable system of claim 6, where said at least one component is operable to determine that a network connection is available and characterized by a communication bandwidth that is high enough to provide the digital media service to the user at a quality level higher than the current quality level by, at least in part, operating to communicate information of the communication bandwidth with the second system.**

122. Claims 4 and 9 depend from claims 1 and 6 respectively. Both dependent claims state one additional limitation on their respective independent claims: communicating (or communicate) “information of the communication bandwidth with the second system.” It is my opinion that claims 4 and 9 are rendered obvious by the combination of Barnes and Shaw.

123. *First*, a POSITA would have found these limitations are rendered obvious because Shaw teaches using a media player that implements the Real Time Streaming Protocol, and a POSITA would have understood that the Real Time Streaming Protocol provides for communicating communication bandwidth information to the streaming server.

124. Shaw explains that media players (including RealPlayer) use the Real Time Streaming Protocol (RTSP) to deliver streaming media:

To deliver the media in real time Real [Player] and QuickTime use RTSP, the Real Time Streaming Protocol. RTSP is an application-level protocol designed to work with lower-level protocols like RTP (Realtime Transport Protocol) and RSVP (Resource Reservation Protocol) to provide a complete streaming service over the Internet.

Ex. 1005, 2:14-19. Shaw describes its media player's use of RTSP in several ways. For example, the DNS SRV query identifies servers available to provide service using RTSP:

A client machine includes a media player provisioned to perform a query to a CDNSP nameserver having a network map of Internet traffic conditions. In a preferred embodiment, the query is a DNS SRV lookup and includes an identification of the client player. *The query is made asking for a particular service (e.g., RTSP)* via a particular protocol (TCP) in a particular CDNSP domain.

Id., 3:48-54 (emphasis added); *see also id.*, 7:39-41, Abs. Other examples are Shaw's description of using RTSP's OPTIONS and DESCRIBE commands to test servers. *See id.*, 8:13-31. Thus, a POSITA would have understood that Shaw teaches using a media player that implements RTSP.

125. A POSITA would have found it obvious that a media player according to Shaw's teachings communicates information of the communication bandwidth with the second system because Shaw's media player implements RTSP and RTSP

provides for sending an indication of the client's available bandwidth in the header of a request sent to a server (i.e., second system):

The Bandwidth request header field describes the estimated bandwidth available to the client, expressed as a positive integer and measured in bits per second. *The bandwidth available to the client may change during an RTSP session*, e.g., due to modem retraining.

Ex. 1006 (RFC2326), 46 and 44 (describing header field definitions). A POSITA would have understood that this teaches a communication with a second system because the bandwidth request header is a data field included in an request sent from the RTSP client to the RTSP server. And, a POSITA would have found it obvious that the bandwidth available to the client included in the request is the client's estimate of the communication bandwidth available between the RTSP client and the RTSP server because the bandwidth of the connection between the client and the server is what limits the ability to reproduce a stream in real-time. In other words, if the bandwidth is too low, then the client cannot receive data from the server to reproduce the stream in real-time, which leads to the pause in playback caused by buffering that is familiar to users of streaming media.

126. A POSITA would have been knowledgeable of the features of the Real Time Streaming Protocol and would have known how to implement the standard. A POSITA would have known that Real Time Streaming Protocol (RTSP) refers to a standard issued by the Internet Engineering Task Force (IETF)

designated RFC2326. For example, a patent application filed on January 19, 2001 (and directed to a video content transmitting system and method) identified “RTSP (Real Time Streaming Protocol (RFC2326))” as an IETF standard that is relevant to multimedia communications over networks. See Ex. 1008, [0002]-[0003]. The IETF is a well-known standards body because it has issued a number of influential standards, such as the Hypertext Transfer Protocol (HTTP). A POSITA would have also known that IETF standards are available from the IETF website at www.ietf.org. See, e.g., Ex. 1009 (international patent application published on March 23, 2000 noting that the Real Time Streaming Protocol is published as RFC 2326 and available from ietf.org). Ex. 1006 is a copy of RTSP protocol (RFC2326) published on the IETF’s website. It was also well-known in the industry that a published RFC never changes and any errors in an RFC is corrected by the issuance of a separate errata. See <https://www.ietf.org/standards/rfcs/>.

127. *Second*, a POSITA would have found that this limitation is suggested by Shaw’s teachings relating to multi-rate stream encoding. As described above (*see supra* ¶29, 65), it was common for content owners to encode streaming media at multiple encoding bit rates so that users with faster connections can receive a higher-quality stream (i.e., a stream encoded at a higher bit rate), while users with slower connections can still receive the stream albeit at a lower-quality level (i.e., a stream encoded at a lower bit rate). Ex. 1005, 1:37-40, 1:47-58. A POSITA would

have understood from this teaching that it is advantageous for the streaming client to inform the streaming server of the communication bandwidth between the streaming client and streaming server so that the streaming server can choose the encoding with the highest encoding bit rate that can be delivered in real-time given the available bandwidth.

128. Finally, to the extent Patent Owner argues that Shaw does not sufficiently teach communicating information of the communication bandwidth with the second system, it would have been an obvious improvement based on Barnes' teachings of determining and communicating the bandwidth of a network connection. Barnes teaches that a client can determine the communication bandwidth (such as to an available network) by requesting communication and establishing communication with the available network:

Prior to communicating with the external system, the device 101 preferably transmits a request for communication via the various networks with which the device 101 is designed to communicate. In addition, communications with some networks (e.g., always on networks) may already be established. Thus, the determination of the available networks with which to establish the desired communication, and *information relating to it (e.g., bandwidth data), can be established during the requested communication.*

Ex. 1004, [0073] (emphasis added).

129. Given that Barnes' portable device determines the communication bandwidth of the second system (available network) "during the requested communication" (Ex. 1004, [0073]), a POSITA would have found it obvious that the portable system and the second system communicate information of the communication bandwidth with the second system.

6. Dependent Claims 5, 10

5. **The method of claim 1, where the portable system automatically performs, without user interaction, said determining, said using, and said delivering the digital media content at the higher quality level to the user.**
10. **The portable system of claim 6, where the at least one component is operable to automatically perform, without user interaction, said determining, said using, and said delivering the digital media content at the higher quality level to the user.**

130. Claims 5 and 10 depend from claims 1 and 6, respectively. It is my opinion that the combination of Barnes and Shaw renders this limitation obvious in based on Shaw's teachings of an enhanced client media player.

131. It is my opinion that Shaw teaches a client media player that automatically performs, without user interaction, said determining, said using, and said delivering the digital media content at the higher quality level to the user because Shaw teaches a client player that *periodically* looks for another available, better source (server) to deliver the streaming content at a higher quality level to the user. *See* Ex. 1005, 3:62-66 ("*Periodically*, the client player code repeats the

DNS SRV query during playback to *determine whether there is a better source* for the stream. If so, the player is controlled *to switch to the better stream source ‘on the fly’* if appropriate to maintain and/or enhance the quality of service.”)

(emphasis added), 9:14-19. A POSITA would have understood that this periodic teaching would include the system automatically, without user interaction, performing Shaw’s method of determining the best server from which to obtain a stream.

132. Shaw also teaches the client media needs to continually keep looking for a better media source (server) because “the ‘best’ [server] can change very quickly given the relatively large size of most streams (and the near-infinite size of all live streams).” *Id.*, 3:33-36. Therefore, Shaw teaches that “[i]t would be desirable to enable a client player to identify a best server *dynamically* and, when appropriate, to enable the player to selectively switch from one server to another during the process of downloading and outputting a given stream or other large file.” Ex. 1005, 3:40-44. A POSITA would have understood that Shaw’s dynamic teaching would include the system performing the search, determination of the best server, and switching the stream to the best server to occur without user interaction.

133. Shaw thus teaches that the client player be “enabled” to “periodically” (see *id.*, 3:62-64, Abs., FIG. 4 (step 408)) and “dynamically,” and without user

assistance to such determining in claim limitations [1c] and [6c], and such using and delivering in claim limitations [1d] and [6d].

VI. BACKGROUND AND QUALIFICATIONS

134. This section contains a summary of my educational background, career history, publications, and other relevant qualifications. My full curriculum vitae is attached as Appendix 1 to this declaration.

135. I am presently a Professor and the former Chair of the Electrical Engineering Department at Lamar University, where I am the inaugural holder of the William B. and Mary G. Mitchel Endowed Chair in Telecommunications. I have held this position since August 2001.

136. I received a B.S. in Chemistry and Electrical Engineering from the Virginia Military Institute in 1975. I received M.S. and Ph.D. degrees in Electrical Engineering from New Mexico State University (NMSU) in 1981 and 1985, respectively. My Ph.D. training was in digital signal processing and, more specifically, communications and control. During my graduate studies at NMSU, the work on my doctorate was performed at the Physical Sciences Laboratory in a government classified area known as the NMSU Image Processing Laboratory. This lab was equipped with one of the first disk drives (1983) to enable digital video processing and my dissertation involved an imaging tracker that utilized this

technology. Therefore, my experience with digital media and video spans over thirty-five years.

137. I also have experience in digital systems engineering in areas that include research, teaching, product design, and technical analysis. My industry experience includes working as a Digital Systems Engineer at General Instrument Corporation, as a Digital Systems Engineer at Space Communications Company, and as a Staff Engineer at Martin Marietta Orlando Aerospace (now Lockheed Martin). I was also the President and Chief Engineer at I-Math Associates, where I supervised projects involving image and video processing for military applications. My work at Martin Marietta and at I-Math Associates involved digital video algorithm development in connection with contracts for the US Government. I have also consulted for the following companies: The Center for Occupational Research and Development (Waco, TX); Frontier Technologies, Inc. (Orlando, FL); The American Academy of Ophthalmology (San Francisco, CA); McDonnell-Douglas Aerospace Co. (St. Louis, MO); Martin-Marietta Orlando Aerospace n/k/a Lockheed Martin (Orlando, FL and Denver, CO); Autonomous Technologies, Inc. (Orlando, FL); National Instruments (Austin, TX); Analog Devices (Norwood, MA); and Quantronix, Inc. (Farmington, UT).

138. My academic experience includes the following positions at the University of Central Florida: Assistant Professor of Electrical Engineering

(September 1986–August 1991); Associate Professor of Electrical Engineering (September 1991–August 1997); and Professor of Electrical Engineering (September 1997–August 2001). I have taught graduate level courses in digital telecommunications and image processing. These courses have included topical units such as video and audio compression schemes; e.g., MPEG, decoding schemes; e.g., Viterbi, and HDTV/ATSC modulation methods; e.g., 8-VSB.

139. I am the author or co-author of numerous peer-reviewed scientific publications on signal processing, image processing, digital systems, and digital telecommunications systems.

140. I am a Senior Member of the Institute of Electrical and Electronics Engineers (IEEE) and served as the Chair of the Beaumont Section from 2002 to 2006 and East Area Chair of Region V from 2006 to 2007. I am also a member of the Video Quality Experts Group (VQEG), an organization similar to JPEG and MPEG.

141. Also, I am an actively registered Professional Engineer in electrical engineering in the states of Texas (Lic#94458) and Florida (Lic#94001152) and teach courses related to professional development that include the use of standards in engineering practice. Digital media compression standards, such as the MPEG standard suite, are critical for the interoperability of devices in commerce and the avoidance of conflict between devices.

142. A number of my publications, presentations, doctoral dissertations and master's theses supervised are in the fields of digital media processing and networking. For example:

— “Video and Bandwidth: The Promise of Profitability,” *International Engineering Consortium Annual Review of Communications*, Volume 60, December 2007.

— “Gabor Difference Analysis of Digital Video Quality,” *IEEE Transactions on Broadcasting*, 50:3, September 2004, pp. 302– 311, (with J. Guo and M. Van Dyke-Lewis).

— “No-Reference Digital Video Quality Analysis,” *International Engineering Consortium Annual Review of Communications*, Volume 57, September 2004, (with J. Guo and M. Van Dyke-Lewis).

— Myler, H. R., Bagasrawala, S. A., Narayana, N. V., “A Concurrent Processing Approach for Software Defined Radio Baseband Design,” 2005 IEEE Region V Technical Conference, Denver, Colorado, April 2005.

— Supervised master's thesis of Pramod Varma, 2005, entitled “High Speed Data Transfer Over IEEE 1394 for Software Defined Radio.”

— Supervised master's thesis of Samir v. Bansikar, 2003, entitled “Optimization of JPEG Image Compression Using Video Quality Metric.”

- Supervised master’s thesis of Supriya Kher, 2003, entitled “Object Tracking in Compressed MPEG Video Bitsream.”
- Supervised master’s thesis of Nirban Bhowmick, 2015, Mobile Multimedia Performance Differences in a UMTS LTE-Based Self-Organizing Network With and Without Soft Handover
- Supervised master’s thesis of Mohammad Al-Amin Chowdhury, 2015, Femtocell and its Deployment with Macrocell Network for Increasing Capacity of the Entire Network
- Supervised master’s thesis of Sreenivasarao Kallempudi, 2011, High Fidelity Mobility Model Simulation for a DVB-H Terminal Communication
- Supervised master’s thesis of Anupam Shital Nepal, 2011, Optimization of Handoff Between CDMA and WLAN
- Supervised master’s thesis of Chiraq Soni, 2007, Analysis of Cell Phone Repeaters and Prototype Design of an Economical CDMA Cell Phone Coverage Signal Expander for Indoor Applications
- Supervised master’s thesis of Akshat Nanda, 2005, A Performance Analysis of Micro-Architectures for Mobile Device Communications

143. Additional details about my employment history, fields of expertise, and publications are included in my curriculum vitae included herewith as Appendix 1.

A. Compensation

144. For my efforts in connection with the preparation of this declaration I have been compensated at my standard rate for this type of consulting activity. My compensation is in no way contingent on the results of these or any other proceedings relating to the above-captioned patent.

B. Materials and Other Information Considered

145. I have considered information from various sources in forming my opinions. I have reviewed and considered each of the exhibits listed in the attached Appendix 2 (Materials Considered in the Preparation of This Declaration) in forming my opinions.

VII. UNDERSTANDING OF THE LAW

146. I am not an attorney. In forming my opinions in this Declaration, I applied the relevant legal principles provided to me by counsel, which are summarized in Appendix 4.

VIII. RESERVATION OF RIGHTS

147. My opinions are based upon the information that I have considered to date. I am unaware of any evidence of secondary considerations with respect to the '992 Patent that would render any of the challenged claims non-obvious. I reserve the right, however, to supplement my opinions in the future to respond to any arguments raised by the owner of the '992 Patent and to take into account new information that becomes available to me.

148. I declare that all statements made herein of my knowledge are true, and that all statements made on information and belief are believed to be true, and that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code.

Executed on December 14, 2020.

By:



Harley R. Myler, Ph.D.

APPENDIX 1: CURRICULUM VITAE OF HARLEY R. MYLER, PH.D.

Harley R. Myler, Ph.D., P.E.

University Address

Phillip M. Drayer Department of
Electrical Engineering
Lamar University Box 10029
Beaumont, Texas 77710-0029

409.880.8751

h.myler[*@*]lamar.edu

Home Address

2495 Evalon Street
Beaumont, TX 77702

409.838.2327

h.myler[*@*]myler.org

Professional Preparation

New Mexico State University	1985	Ph.D., Electrical Engineering
	1981	M.S., Electrical Engineering

Virginia Military Institute	1975	B.S., Chemistry & Electrical Engineering (double-major)
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Academic Appointments

2001-	Professor, Lamar University Electrical Engineering W ^m B. and Mary G. Mitchell Endowed Chair in Telecommunications
2001-2019	Department Chair, Lamar University Electrical Engineering
1997-2001	Professor, University of Central Florida
1991-1997	Associate Professor, University of Central Florida
1986-1991	Assistant Professor, University of Central Florida
1985-1986	Adjunct Professor, Florida Institute of Technology
1984-1985	Instructor, New Mexico State University

Industrial Experience

President, I-Math Associates, Orlando, FL.
Staff Engineer, Martin Marietta Orlando Aerospace, Orlando, FL.
Digital Systems Engineer, Space Communications Company, Las Cruces, NM.
Digital Systems Engineer, General Instrument Corporation, El Paso, TX.
CPT, US Army Air Defense Artillery, Missile Systems Officer.

Academic/Research/Creative Summary

I have been active in research since the beginning of my graduate education at the New Mexico State University. I worked as an Instructor and Research Assistant in the Department of Electrical & Computer Engineering and was funded through the Electronic Vision Analysis Laboratory (EVAL) under a grant from the U.S. Army Atmospheric Sciences Lab at White Sands, New Mexico. My dissertation, *Knowledge-Based Intelligent Tracking* (1985), was researched at the lab and was an early exploration into knowledge-based control and fuzzy-logic systems using digital video. Since then, I have authored or co-authored over thirty refereed journal and special collection articles, over fifty conference proceedings articles, four books that have been enthusiastically received by the engineering and scientific communities and I have been granted four utility patents. My books are in distribution internationally with over ten thousand volumes in print. I supervised six doctorates (PhD) while at the University of Central Florida and five (DE) at Lamar University. I have been PI or Co-PI for over \$1.5M in federally funded grants and was named "Researcher of the Year" four times by my colleagues at the University of Central Florida. At Lamar University, I have been given the distinguished honor of being named the inaugural holder of the William B. and Mary G. Mitchell Endowed Chair in Telecommunications. Also at Lamar, I am the inventor of the first and second US Patents to be assigned to the university, patents that were prosecuted through the USPTO using private funding. I am the first engineering faculty member in Lamar's history to receive not one, but three *Fulbright Scholar* awards.

Patents and Software Copyrights

U.S. Patent #8,963,738: *Vehicle information systems and methods*, 2015.

U.S. Patent #8,581,744: *Traffic Information Warning Systems and Methods*, 2013.

U.S. Patent #6,577,764: *Method for Measuring and Analyzing Digital Video Quality*, 2003.

U.S. Patent #5,094,521: *Trophorometer*, 1991.

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Books

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2. Myler, H. R., *Fundamentals of Machine Vision: Theory and Application*, SPIE Press, 1998.
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2. Dadvar, M., Moazami, S., Myler, H. R., & Zargarzadeh, H. "Multiagent Task Allocation in Complementary Teams: A Hunter-and-Gatherer Approach." *Complexity*, 2020.
3. Naddaf-Shah, M., Myler, H.R., and Zargarzadeh, H.. "Design and Implementation of an Assistive Real-Time Red Lionfish Detection System for AUV/ROVs." *Complexity*, 2018.
4. Guntaka, R. and Myler, H.R., Regression and kriging analysis for grid power factor estimation. *J. Electr. Syst. Inform. Technol.* (2015), <http://dx.doi.org/10.1016/j.jesit.2014.12.005>
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Conference and Proceedings Articles and Presentations

1. Harley Myler, "SeaDog: AUV support for Lionfish harvesting," Poster Presentation, *2018 Lionfish Summit*, Florida Fish and Wildlife Conservation Commission, Cocoa Beach, FL, October 2-4, 2018.
2. Harley Myler, Liv Haselbach, Qin Qian, "Assessing Environmental Impact of Artificial Reefs Using AUVs," Poster Presentation, *2018 Lionfish Summit*, Florida Fish and Wildlife Conservation Commission, Cocoa Beach, FL, October 2-4, 2018.
3. Qin Qian, Fernando Aleman, Hayden Rice, Andre Trottier, Liv Haselbach, Harley Myler, "pH Profiles around Pervious Concrete in Fresh Water," *Proceedings of the International Low Impact Development Conference* 2018.
4. M. W. Rony, P. Bhowmik, H. R. Myler and P. Mondol, "Short Channel Effects suppression in a dual-gate Gate-All-Around Si nanowire junctionless nMOSFET," *2016 9th International Conference on Electrical and Computer Engineering (ICECE)*, Dhaka, Bangladesh, 2016, pp. 538-541.
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10. Myler, H. R., "Intellectual Property Issues," Southwest Electrical and Computer Engineering Department Heads Association (SWECEDHA) Annual Meeting, Sante Fe, New Mexico, November 2007.
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51. Myler, H. R., "Machine Vision Analysis of Human Eye Movements," *Proceedings of the 20th Annual Pittsburgh Conference on Modeling and Simulation*, May 1989.
52. Myler, H. R., "Design Optimization of a Six-Legged Walking Platform," *Proceedings of the 20th Annual Pittsburgh Conference on Modeling and Simulation*, May 1989.
53. Gonzalez, A.J., and Myler, H. R., "An Intelligent Instructor Support System for Training Simulators," *Proceedings of the 1989 AI and Simulation Conference*, April 1989.
54. Gonzalez, A. J., Myler, H. R., and Towhidnejad, M., "Automated Knowledge Generation in Support of Shuttle Ground Operations," *Proceedings of the Artificial Intelligence in Government Conference*, March 1989.
55. Myler, H. R. and Gonzalez, A. J., "Automated Knowledge Base Generation from CAD Databases Using Relaxation Techniques," *Proceedings of the International Symposium on Intelligent Control*, August 1988.
56. Myler, H. R., "Visual Primitive Recognition," *Proceedings of the 19th Annual Pittsburgh Conference on Modeling and Simulation*, May 1988.
57. Myler, H. R., "Object-Oriented Training Simulation," *Proceedings of the SCS Eastern Simulation Conference*, April 1988.
58. Myler, H. R., "Application of Hopfield Networks to Visual Tracking," *Proceedings of the 18th Annual Pittsburgh Conference on Modeling and Simulation*, 18, 1987.
59. Myler, H. R., Thompson, W. E. and Flachs, G. M., "Knowledge-Based Enhancement of Visual Tracking," *Proceedings of the IEEE International Conference on Acoustics, Speech, and Signal Processing*, 2, 1985.
60. Myler, H. R., Thompson, W. E. and Flachs, G. M., "Application of Expert System Techniques to a Visual Tracker," *Proceedings of the SPIE Conference on Artificial Intelligence II*, 1985.
61. Myler, H. R. and Thompson, W. E., "Knowledge-Based Intelligent Tracking," *IEEE International Conference on Systems, Man, and Cybernetics*, 1985.
62. Myler, H. R. and Thompson, W. E., "Computer Simulation of Intelligent Tracking," *Proceedings of the 17th Annual Pittsburgh Conference on Modeling and Simulation*, 1986.
63. Karshmer, A. I., Myler, H. R. and Davis, R., "An Inexpensive and Portable Talking Tactile Terminal for the Visually Handicapped," *Proceedings of the 19th Annual Hawaii International Conference on Systems Science*, 3, 1986.

Awards and Honors

W^m B. and Mary G. Mitchell Endowed Chair, Lamar University, inaugural holder, 2001- present.

Fulbright Scholar, École Supérieure Privée d'Ingénierie et de Technologies (ESPRIT) in Tunis, Tunisia, February 2012 and July 2012.

Tau Beta Pi (engineering), Eta Kappa Nu (electrical engineering)

Educator of the Year, UCF Department of Electrical & Computer Engineering, 1993.

Researcher of the Year, UCF Department of Computer Engineering, 1988, 1989, 1990, 1992.

Academy Member, Klipsch School of Electrical & Computer Engineering, New Mexico State University.

CRC Freshman Chemistry Award, 1973.

Eagle Scout, 1970, Troop 108, Leetsdale, Pennsylvania, BSA.

Doctoral Field Studies Supervised (Lamar University)

Mohammad A Islam, DE, 2020
Gate-All-Around Nanowire MOSFET for DNA Sequencing

Palash K Datta, DE, 2020
Ultra Low Power Preset/Evaluate Style Circuit Design Using Novel Spintronic Switch

Koji Hirano, DE, 2014
Image Processing with Memristors

Abdulhamid A. Al Hamoud, DE, 2013
Model Design for Industrial Supervisory Control

Rajesh Guntaka, DE, 2012
Regression And Kriging Analysis For Grid Power Factor Estimation

Wei-Tai Hsu, DE, 2009
A Dynamic Facial Recognition System for Tracking Individuals in an Enclosed Domain

Jing Jane Guo, DE, 2003
Gabor Difference Analysis of Digital Video Quality

Dissertations Supervised (University of Central Florida)

Liviu Voicu, PhD, 1997
Issues in Multiresolution Genetic Algorithms

Wissam Rabadi, PhD, 1995
Multiresolution Image Processing

- Hoi Yoo, PhD, 1993
VITREO: Viewpoint Independent Three-dimensional Recognition and Extraction of Objects
- Massood Towhidnejad, PhD, 1990
Functional Conflict Resolution in Automated Knowledge Generation
- John DeCatrel, PhD, 1990
Recognition by Aspect Constrained Stochastic Optimization
- Gregory Heileman, PhD, 1989
Theoretical and Experimental Aspects of Supervised Learning in Artificial Neural Networks.

Theses (MSEE) Supervised—Lamar University

- Mohammed Wahiduzzaman Rony, 2016, *Short Channel Effects Suppression in a Dual-Gate Gate-All-Around Si Nanowire Junctionless nMOSFET.*
- Nirban Bhowmick, 2015, *Mobile Multimedia Performance Differences in a UMTS LTE-Based Self-Organizing Network With and Without Soft Handover*
- Mohammad Al-Amin Chowdhury, 2015, *Femtocell and its Deployment with Macrocell Network for Increasing Capacity of the Entire Network*
- Sreenivasarao Kallemudi, 2011, *High Fidelity Mobility Model Simulation for a DVB-H Terminal Communication*
- Anupam Shital Nepal, 2011, *Optimization of Handoff Between CDMA and WLAN*
- Viren Mathuria, 2010, *Ultra-Wideband RFID Based Localization, Obstacle Detection and Speed Optimization for Automated Guided Vehicles*
- Chirag Soni, 2007, *Analysis of Cell Phone Repeaters and Prototype Design of an Economical CDMA Cell Phone Coverage Signal Expander for Indoor Applications*
- Hikmet Cenghiz, 2006, *A Biomimetic Approach to Motion Estimation in a SIMD Architecture*
- Pramod Varma, 2005, *High Speed Data Transfer Over IEEE 1394 for Software Defined Radio*
- Venkata Prabala, 2005, *Analysis of the Infinite Image Window*
- Akshat Nanda, 2005, *A Performance Analysis of Micro-Architectures for Mobile Device Communications*
- Deepika Shevade, 2005, *Multiple Object Tracking in an Image Sequence*
- Shabbir A. Bagasrawala, 2004, *OFDM in a Parallel Architecture Implementation*

of a Software Defined Radio

Naresh V. Narayana, 2004, *GSM Baseband Optimization On A Software Defined Radio Parallel Processing Architecture*

Mithun Bannerjee, 2004, *Implementation of ITU-T G.729 Speech Codec*

Samir V. Bansikar, 2003, *Optimization of JPEG Image Compression Using Video Quality Metric*

Ravi Bellapu, 2003, *Steganographic Techniques for No-Reference Digital Video Quality Analysis*

Supriya Kher, 2003, *Object Tracking in Compressed MPEG Video Bitsream*

Prashant. K. Ruparel, 2003, *Auralization Synthesis (Sonification) for Control Room Alerts*

Theses (MSEE) Supervised—University of Central Florida

Mosleh Uddin, 1998, *A Parallel Algorithm for Target Classification Using Geometric Hashing*

Arthur Chang, 1994, *Implementation of the Two-Dimensional Fast Hartley Transform on a Fine-grained SIMD Architecture*

Benito Graniela, 1992, *Visual Primitive Decomposition Using the Pattern Spectrum*

Jill Giles, 1991, *A Medial Axis Transformation Language for Recognizing Aircraft Silhouettes Using a Genetic Search Technique*

Kathleen Meade, 1991, *A Novel Algorithm for Detecting Erroneous Control Points in Geometric Correction of Imagery*

Gary Hall, 1991, *ANNview: A CASE Tool for Development and Evaluation of Artificial Neural Networks*

Randall Gillis, 1991, *A General Object-Oriented Environment for the Development of Artificial Neural Network Models on a Hypercube Multiprocessor Network*

Shuk Fong Lai, 1990, *Algorithms for Fine-Grained Architecture Implementation of 2-Dimensional Fast Walsh-Hadamard Transforms*

Cynthia Johnson, 1990, *Counterpropagation Neural Network Detection of Visual Primitives*

Mitchell Winter, 1989, *VLSI Implementation of a Configurable Neural Node*

Paul Vogt, 1988, *An Adaptive Multi-Scene Correlation Algorithm*

Ronald Bauman, 1988, *GAPP Instruction Simulator*

Eric Grajales, 1987, *Edge Confidence Estimation for Subsequent Image Analysis*

Julie LeBlanc, 1987, *Implementation of a Parallel Ynet Architecture*

Nancy Burrell, 1986, *Adaptive Discrete Cosine Transform Image Compression Applied to Visual Flight Simulators*

Robert Holden, 1986, *Design Considerations in the Development of an Automated Cartographic System*

Research & Equipment Grants

Center for Advances in Port Management (CAPM), *Autonomous Robot Measurement of pH Clouds Surrounding Recycled Concrete Aggregates in Marine Life-Cycle Analysis*, \$34,784.

Center for Advances in Water and Air Quality (CAWAQ), *AARISE: An Aquatic Robot for Lionfish Remediation*, \$24.9K.

Operation Technology, Inc., *ETAP*, \$125K.

Entergy Corporation, *Power Grid Defense for Solar Magnetic Storms*, \$30K.

Phillips Electronics, *LineDancer Software Radio development system*, \$25K.

Launching the Texas Engineering Education Pipeline: Deploying the Infinity Project Statewide, THECB, Austin, Texas, \$71K.

Edison Museum Website, Entergy Corporation, Beaumont, Texas, \$5K.

Adaptive Synthesis of an Objective Image Quality Function, TeraNex, Inc., Orlando, Florida, \$190,469.

Memory-Based Reasoning for Advanced Launch Operations, NASA Grant #NCC-10-0003, Kennedy Space Center, Titusville, Florida. \$147,448.

Automated Knowledge Generation (Co-Pi with A. Gonzalez) NASA Grant #NAG-10-0043, Kennedy Space Center, Titusville, Florida, \$456,095.

Visual Simulation Characteristics as Related to Human Factors and Training Needs (Co-Pi with R. Gilson) Army Research Institute, NTSC, Orlando, Florida. \$75K.

Visual Display Taxonomy (Summer, Co-Pi with R. Gilson). ARI Grant #M67-004/87/M/2227, Naval Training Systems Center, Orlando, Florida, \$22,924.

Investigation of Connectionist Vision Models for Knowledge-Based Intelligent Tracking Systems. Center for Research in Electro-Optics and Lasers, grant #2052033, University of Central Florida, \$44,670.

CREOL Support to the Innovative Science & Technology Program II: Array Imaging (2 years, Co-Pi with P. Gatt, M. Stickley, A. Weeks) Office of Naval Research, Boston, Massachusetts, \$140,173.

CREOL Support to the Innovative Science & Technology Program III: Array Imaging (Co-Pi with P. Gatt, M. Stickley, A. Weeks) Office of Naval Research, Boston, Massachusetts, \$94,462+30K for nCUBE.

CREOL Support to the Innovative Science & Technology Program IV: Array Imaging (Co-Pi with P. Gatt, M. Stickley, A. Weeks) Office of Naval Research, Boston, Massachusetts, \$412K.

Software Tools for Neural Network Modelling, (Co-PI with M. Georgiopolous, & G. Heileman), Florida High Technology Council, \$20K.

Parallel Network Modelling Tools, Martin Marietta Orlando Aerospace, \$10K. Florida Space Grant Consortium--Undergraduate Research Participation Program NASA sponsored program for undergraduate research, \$20K.

Design Considerations in Construction of Planetary Walking Vehicles, Martin Marietta Astronautics Company, Denver, Colorado, \$3K.

nCUBE Parallel Supercomputer (Equipment Grant w/ A. Weeks) nCUBE, Cupertino, California, \$160K.

Sparcserver 4/280 (Equipment Grant w/ A. Weeks) Sun Microsystems Incorporated, Mountainview, California, \$141K.

Expert Systems Software/Hardware. (Equipment Grant w/ A. Gonzalez) NASA Grant #NAG-10-0043, Kennedy Space Center, Titusville, Florida, \$31,025.

Towerview Workstations (Equipment Grant) NCR Corporation, Engineering & Manufacturing, Lake Mary, Florida, \$6,345.

Consulting Experience

I-Math Associates, Orlando, FL.

McDonnell-Douglas Aerospace Co., St. Louis, MO.

Martin-Marietta (now Lockheed), Orlando, Florida and Denver, CO.
National Instruments, Austin, TX.
Analog Devices, Norwood, MA.

Leadership/Service Summary

At the University of Central Florida, I served on the Faculty Senate for two terms and on the SAC's Computer Committee. I was a founding member of the IEEE Orlando Section Systems, Robotics and Controls Society, a Chairman of that society for two years, and the founding advisor of the Student Chapter of the society. After moving to Beaumont Texas, I was elected Chair of the Beaumont Section of the IEEE and served two terms. In 2006, I served as the IEEE Region 5 East Area Chair. I have emphasized professional development in my activities with student organizations and have assisted the public schools in many ways to include assistance with computer network access, conduct of workshops for the engineering awareness education of High School teachers and students, and in the support of student science fair projects. At Lamar University, I am the university representative to the *Barry M. Goldwater Scholarship and Excellence in Education Program* and during my tenure three students of mine have received the Goldwater Scholarship, the only three in the history of the institution. I have also been an active member of the Beck Fellowship committee, which is charged with selecting the very best and brightest of students for unique opportunities in undergraduate research and creative study.

Active Professional Organizations and Licenses

IEEE –Life Senior Member (2019-present)
Senior Member (1991-2018)
East Area Chair, IEEE Region V (2006-2007)
Chair, Beaumont Section (2002-2006)
Florida Professional Engineer (by examination)
Electrical Engineering Lic. 94001152
Texas Professional Engineer
Electrical Engineering Lic. 94458

Student Organizations, Activities and Special Advisement

Director (Summer 2016) Xplore LUEE Summer Camp (STEM outreach)
Advisor (2002-present) *Eta Kappa Nu*, *Delta Beta* Chapter (Lamar University)
Advisor (2005-present) *Kappa Alpha Order*, *Gamma Xi* (Lamar University)
Founding Advisor (1988-1999), UCF IEEE Robotics Society Student Chapter
Advisor (1993-1995) *Eta Kappa Nu*, *Zeta Chi* Chapter (UCF)

APPENDIX 2: MATERIALS CONSIDERED IN THE PREPARATION OF THIS DECLARATION

Exhibit No.	Description
1001	U.S. Patent No. 8,270,992 (“the ’992 patent”)
1002	Prosecution File History for the ’992 patent
1003	Declaration of Harley R. Myler, Ph.D.
1004	U.S. Patent Appl. Pub. No. 2003/0065805 to Barnes (“Barnes”)
1005	U.S. Patent No. 7,299,291 to Shaw (“Shaw”)
1006	Real Time Streaming Protocol (RTSP), RFC2326, IETF 1998. http://www.ietf.org/rfc/rfc2326.txt .
1008	U.S. Patent Appl. Pub. No. 2001/0025378 to Sakamoto et al.
1009	PCT Appl. Pub. No. WO 00/16550 to Gomez et al.

Other Materials Considered:

- U.S. Patent Application No. 2005/0059400 (“Jagadeesan”)
- U.S. Patent Application No. 2003/0017838 (“Kayama”)

APPENDIX 3: CHALLENGED CLAIMS

1[a]. In a portable system, a method for providing a digital media service to a user, the method comprising:

[1b] delivering digital media content having a current quality level to a user;

[1c] determining that a network connection with a second system is available and is characterized by a communication bandwidth that is high enough to provide the digital media content to the user at a quality level higher than the current quality level;

[1d] using the network connection to obtain the digital media content at the higher quality level from the second system; and

delivering the digital media content at the higher quality level to the user instead of the digital media content at the current quality level.

2. The method of claim 1, where the digital media content is video media.

3. The method of claim 1, where the digital media content is audio media.

4. The method of claim 1, wherein said determining comprises communicating information of the communication bandwidth with the second system.

5. The method of claim 1, where the portable system automatically performs, without user interaction, said determining, said using, and said delivering the digital media content at the higher quality level to the user.

6[a]. A portable system for providing a digital media service to a user, the portable system comprising:

at least one component operable to, at least:

[6b] deliver digital media content having a current quality level to a user;

[6c] determine that a network connection with a second system is available and is characterized by a communication bandwidth that is high enough to provide the digital media content to the user at a quality level higher than the current quality level;

[6d] use the network connection to obtain the digital media content at the higher quality level from the second system; and

deliver the digital media content at the higher quality level to the user instead of the digital media content at the current quality level.

7. The portable system of claim 6, where the digital media content is video media.

8. The portable system of claim 6, where the digital media content is audio media.

9. The portable system of claim 6, where said at least one component is operable to determine that a network connection is available and characterized by a communication bandwidth that is high enough to provide the digital media service to the user at a quality level higher than the current quality level by, at least in part,

operating to communicate information of the communication bandwidth with the second system.

10. The portable system of claim 6, where the at least one component is operable to automatically perform, without user interaction, said determining, said using, and said delivering the digital media content at the higher quality level to the user.

11[a]. In a portable system, a method for providing a digital media service to a user, the method comprising:

[11b] delivering digital media content having a current quality level to a user;

[11c] communicating with a second system regarding communication bandwidth of a network connection with the second system;

[11d] determining, based at least in part on said communicating, that the network connection is available and characterized by at least a minimum determined communication bandwidth;

[11e] in response to at least said determining, utilizing the network connection to receive the digital media content at a quality level higher than the current quality level; and

delivering the digital media content at the higher quality level to the user instead of the digital media content at the current quality level.

12. The method of claim 11 where the digital media content is video media.

13. The method of claim 11, where the digital media content is audio media.

14. The method of claim 11, where the portable system automatically performs, without user interaction, said communicating, said determining and said utilizing.

16[a]. A portable system for providing a digital media service to a user, the portable system comprising:

at least one component operable to, at least:

[16b] deliver digital media content having a current quality level to a user;

[16c] communicate with a second system regarding communication bandwidth of a network connection with the second system;

[16d] determine, based at least in part on said communicating, that the network connection is available and characterized by at least a minimum determined communication bandwidth;

[16e] in response to at least said determining, utilize the network connection to receive the digital media content at a quality level higher than the current quality level; and

deliver the digital media content at the higher quality level to the user instead of the digital media content at the current quality level.

17. The portable system of claim 16, where the digital media content is video media.

18. The portable system of claim 16, where the digital media content is audio media.

19. The portable system of claim 16, where the at least one component is operable to automatically perform, without user interaction, said communicating, said determining and said utilizing.

APPENDIX 4: UNDERSTANDING OF THE LAW

I have applied the following legal principles provided to me by counsel in arriving at the opinions set forth in this declaration.

Legal Standard for Prior Art

I am not an attorney. I have been informed by attorneys of the relevant legal principles and have applied them to arrive at the opinions set forth in this declaration.

I understand that the petitioner for inter partes review may request the cancelation of one or more claims of a patent based on grounds available under 35 U.S.C. § 102 and 35 U.S.C. § 103 using prior art that consists of patents and printed publications.

Anticipation and Prior Art

I understand that § 102 specifies when a challenged claim is invalid for lacking novelty over the prior art, and that this concept is also known as “anticipation.” I understand that a prior art reference anticipates a challenged claim, and thus renders it invalid by anticipation, if all elements of the challenged claim are disclosed in the prior art reference. I understand the disclosure in the prior art reference can be either explicit or inherent, meaning it is necessarily present or implied. I understand that the prior art reference does not have to use the same words as the challenged claim, but all of the requirements of the claim must

be disclosed so that a person of ordinary skill in the art could make and use the claimed subject-matter.

In addition, I understand that § 102 also defines what is available for use as a prior art reference to a challenged claim.

Under § 102(a), a challenged claim is anticipated if it was patented or described in a printed publication in the United States or a foreign country before the challenged claim's date of invention.

Under § 102(b), a challenged claim is anticipated if it was patented or described in a printed publication in the United States or a foreign country more than one year prior to the challenged patent's filing date.

Under § 102(e), a challenged claim is anticipated if it was described in a published patent application that was filed by another in the United States before the challenged claim's date of invention, or was described in a patent granted to another that was filed in the United States before the challenged claim's date of invention.

I understand that a challenged claim's date of invention is presumed to be the challenged patent's filing date. I also understand that the patent owner may establish an earlier invention date and "swear behind" prior art defined by § 102(a) or § 102(e) by proving (with corroborated evidence) the actual date on which the

named inventors conceived of the subject matter of the challenged claim and proving that the inventors were diligent in reducing the subject matter to practice.

I understand that the filing date of a patent is generally the filing date of the application filed in the United States that issued as the patent. However, I understand that a patent may be granted an earlier effective filing date if the patent owner properly claimed priority to an earlier patent application.

I understand that when a challenged claim covers several structures, either generically or as alternatives, the claim is deemed anticipated if any of the structures within the scope of the claim is found in the prior art reference.

I understand that when a challenged claim requires selection of an element from a list of alternatives, the prior art teaches the element if one of the alternatives is taught by the prior art.

Legal Standard for Obviousness

I understand that even if a challenged claim is not anticipated, it is still invalid if the differences between the claimed subject matter and the prior art are such that the claimed subject matter would have been obvious to a person of ordinary skill in the pertinent art at the time the alleged invention.

I understand that obviousness must be determined with respect to the challenged claim as a whole.

I understand that one cannot rely on hindsight in deciding whether a claim is obvious.

I also understand that an obviousness analysis includes the consideration of factors such as (1) the scope and content of the prior art, (2) the differences between the prior art and the challenged claim, (3) the level of ordinary skill in the pertinent art, and (4) “secondary” or “objective” evidence of non-obviousness.

Secondary or objective evidence of non-obviousness includes evidence of: (1) a long felt but unmet need in the prior art that was satisfied by the claimed invention; (2) commercial success or the lack of commercial success of the claimed invention; (3) unexpected results achieved by the claimed invention; (4) praise of the claimed invention by others skilled in the art; (5) taking of licenses under the patent by others; (6) deliberate copying of the claimed invention; and (7) contemporaneous and independent invention by others. However, I understand that there must be a relationship between any secondary evidence of non-obviousness and the claimed invention.

I understand that a challenged claim can be invalid for obviousness over a combination of prior art references if a reason existed (at the time of the alleged invention) that would have prompted a person of ordinary skill in the art to combine elements of the prior art in the manner required by the challenged claim. I understand that this requirement is also referred to as a “motivation to combine,”

“suggestion to combine,” or “reason to combine,” and that there are several rationales that meet this requirement.

I understand that the prior art references themselves may provide a motivation to combine, but other times simple common sense can link two or more prior art references. I further understand that obviousness analysis recognizes that market demand, rather than scientific literature, often drives innovation, and that a motivation to combine references may come from market forces.

I understand obviousness to include, for instance, scenarios where known techniques are simply applied to other devices, systems, or processes to improve them in an expected or known way. I also understand that practical and common-sense considerations should be applied in a proper obviousness analysis. For instance, familiar items may have obvious uses beyond their primary purposes.

I understand that the combination of familiar elements according to known methods is obvious when it yields predictable results. For instance, obviousness bars patentability of a predictable variation of a technique even if the technique originated in another field of endeavor. This is because design incentives and other market forces can prompt variations of it, and predictable variations are not the product of innovation, but rather ordinary skill and common sense.

I understand that a particular combination may be obvious if it was obvious to try the combination. For example, when there is a design need or market

pressure to solve a problem and there are a finite number of identified, predictable solutions, a person of ordinary skill has good reason to pursue the known options within his or her technical grasp. This would result in something obvious because the result is the product not of innovation but of ordinary skill and common sense. However, I understand that it may not be obvious to try a combination when it involves unpredictable technologies.

It is further my understanding that a proper obviousness analysis focuses on what was known or obvious to a person of ordinary skill in the art, not just the patentee. Accordingly, I understand that any need or problem known in the field of endeavor at the time of invention and addressed by the patent can provide a reason for combining the elements in the manner claimed.

It is my understanding that the Manual of Patent Examining Procedure §2143 sets forth the following as exemplary rationales that 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 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;
- 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 one of ordinary skill in the art;
- Some teaching, suggestion, or motivation in the prior art that would have led one of ordinary skill to modify the prior art reference or to combine prior art reference teachings to arrive at the claimed invention.

A person of ordinary skill in the art looking to overcome a problem will often use the teachings of multiple publications together like pieces of a puzzle, even though the prior art does not necessarily fit perfectly together. Therefore, I understand that references for obviousness need not fit perfectly together like puzzle pieces. Instead, I understand that obviousness analysis takes into account inferences, creative steps, common sense, and practical logic and applications that a person of ordinary skill in the art would employ under the circumstances.

I understand that a claim can be obvious in light of a single reference, if the elements of the challenged claim that are not explicitly or inherently disclosed in the reference can be supplied by the common sense of one of skill in the art.

I understand that obviousness also bars the patentability of applying known or obvious design choices to the prior art. One cannot patent merely substituting one prior art element for another if the substitution can be made with predictable results. Likewise, combining prior art techniques that are interoperable with respect to one another is generally obvious and not patentable.

In order for a claim to be found invalid based upon a modification or combination of the prior art, there must be reasonable expectation that a person of ordinary skill would have successfully modified or combined the prior art to arrive at the claimed arrangement. This does not mean that it must be certain that a person of ordinary skill would have been successful – the law only requires that the person of ordinary skill in the art would have perceived a reasonable expectation of success in modifying or combining the prior art to arrive at the claimed invention.

In sum, my understanding is that obviousness invalidates claims that merely recite combinations of, or obvious variations of, prior art teachings using understanding and knowledge of one of skill in the art at the time and motivated by the general problem facing the inventor at the time. Under this analysis, the prior art references themselves, or any need or problem known in the field of endeavor

at the time of the invention, can provide a reason for combining the elements of or attempting obvious variations on prior art references in the claimed manner.

Legal Standard for Claim Construction

I understand that before any invalidity analysis can be properly performed, the scope and meaning of the challenged claims must be determined by claim construction.

I understand that a patent may include two types of claims, independent claims and dependent claims. I understand that an independent claim stands alone and includes only the limitations it recites. I understand that a dependent claim depends from an independent claim or another dependent claim. I understand that a dependent claim includes all the limitations that it recites in addition to the limitations recited in the claim (or claims) from which it depends.

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

I understand that to determine how a person of ordinary skill would have understood a claim term, one should look to sources available at the time of the alleged invention that show what a person of skill in the art would have understood disputed claim language to mean. It is my understanding that this may include what is called “intrinsic” evidence as well as “extrinsic” evidence.

I understand that, in construing a claim term, one should primarily rely on intrinsic patent evidence, which includes the words of the claims themselves, the remainder of the patent specification, and the 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. I understand that extrinsic evidence may include principles, concepts, terms, and other resources available to those of skill in the art at the time of the invention.

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 or something more specific. I understand that to determine whether a term has special meaning, the claims, the patent specification, and the prosecution history are particularly important, and may show that the inventor gave a term a particular definition or intentionally disclaimed, disavowed, or surrendered claim scope.

I understand that the claims of a patent define the scope of the rights conferred by the patent. I understand that because the claims point out and distinctly claim the subject matter which the inventors regard as their invention, claim construction analysis must begin with and is focused on the claim language itself. I understand that the context of the term within the claim as well as other claims of the patent can inform the meaning of a claim term. For example, because

claim terms are normally used consistently throughout the patent, how a term is used in one claim can often inform the meaning of the same term in other claims. Differences among claims or claim terms can also be a useful guide in understanding the meaning of particular claim terms.

I understand that a claim term should be construed not only in the context of the particular claim in which the disputed term appears, but in the context of the entire patent, including the entire specification. I understand that because the specification is a primary basis for construing the claims, a correct construction must align with the specification.

I understand that the prosecution history of the patent as well as art incorporated by reference or otherwise cited during the prosecution history are also highly relevant in construing claim terms. For instance, art cited by or incorporated by reference may indicate how the inventor and others of skill in the art at the time of the invention understood certain terms and concepts. Additionally, the prosecution history may show that the inventors disclaimed or disavowed claim scope, or further explained the meaning of a claim term.

With regard to extrinsic evidence, I understand that all evidence external to the patent and prosecution history, including expert and inventor testimony, dictionaries, and learned treatises, can also be considered. For example, technical dictionaries may indicate how one of skill in the art used or understood the claim

terms. However, I understand that extrinsic evidence is considered to be less reliable than intrinsic evidence, and for that reason is generally given less weight than intrinsic evidence.

I understand that in general, a term or phrase found in the introductory words or preamble of the claim, should be construed as a limitation if it recites essential structure or steps, or is necessary to give meaning to the claim. For instance, I understand preamble language may limit claim scope: (i) if dependence on a preamble phrase for antecedent basis indicates a reliance on both the preamble and claim body to define the claimed invention; (ii) if reference to the preamble is necessary to understand limitations or terms in the claim body; or (iii) if the preamble recites additional structure or steps that the specification identifies as important.

On the other hand, I understand that a preamble term or phrase is not limiting where a challenged claim defines a structurally complete invention in the claim body and uses the preamble only to state a purpose or intended use for the invention. I understand that to make this determination, one should review the entire patent to gain an understanding of what the inventors claim they invented and intended to encompass in the claims.

I understand that 35 U.S.C. § 112 ¶ 6 created an exception to the general rule of claim construction called a “means plus function” limitation. These types of

terms and limitations should be interpreted to cover only the corresponding structure described in the specification, and equivalents thereof. I also understand that a limitation is presumed to be a means plus function limitation if (a) the claim limitation uses the phrase “means for”; (b) the “means for” is modified by functional language; and (c) the phrase “means for” is not modified by sufficient structure for achieving the specified function.

I understand that a structure is considered structurally equivalent to the corresponding structure identified in the specification only if the differences between them are insubstantial. For instance, if the structure performs the same function in substantially the same way to achieve substantially the same result. I further understand that a structural equivalent must have been available at the time of the issuance of the claim.