

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

PELOTON INTERACTIVE, INC.,
Petitioner,

v.

NEC CORPORATION,
Patent Owner.

Case No. IPR2023-01239
Patent No. 8,752,101

DECLARATION OF DR. DAN SCHONFELD
IN SUPPORT OF PATENT OWNER PRELIMINARY RESPONSE

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I, Dan Schonfeld, Ph.D. declare as follows:

1. I make this Declaration based upon my own personal knowledge and, if called upon to testify, would testify competently to the matters contained herein.
2. I understand that Peloton Interactive, Inc. (“Petitioner” or “Peloton”) submitted a petition (“Petition”) for *inter partes* review, challenging Claims 1, 2, 4, 5, 7, 11, 12, 14-18, 20-23, and 25-29 (the “Challenged Claims”) of U.S. Patent No. 8,752,101 (the “’101 Patent”). I have been asked by counsel for Patent Owner, NEC Corporation (“Patent Owner” or “NEC”) to provide technical opinions in connection with the *inter partes* review. I am being compensated for my time at my standard consulting rate. My compensation is not dependent in any way upon the outcome of this matter.
3. I submit this Declaration in support of Patent Owner’s Preliminary Response. I reserve the right to supplement my opinions, should I be requested to provide additional analysis in connection with the patentability of the Challenged Claims.

I. INTRODUCTION

A. Background and Qualifications

4. I am an expert in media streaming technologies. My experience is based on my education and work, which are summarized below and reflected in my curriculum vitae. A copy of my complete curriculum vitae is attached to this Declaration as Exhibit 2002.

5. I have worked in the area of media streaming since my doctoral studies on morphological image coding. I have continued to do research in the broad area of media streaming including video coding, video transmission, video communications, and video networking. I have taught courses in media streaming and introduced a new senior-level undergraduate course titled “Multimedia Systems,” which covers various topics in media streaming including adaptive bitrate streaming. I have also served as a consultant in industry in the area of media streaming. For example, in 1997, I have worked as a consultant in the area of audio and data streaming using cellular communications for PrairieComm Corp. In 1998, I served as a consultant for the Chicago Mercantile Exchange to provide guidance in the design and deployment of a global videoconference system using satellite communications. Over the past two decades, I have also served as a consultant and expert witness in several cases involving both media streaming generally and adaptive bitrate streaming in particular for various companies.

B. Summary of Opinion

6. As noted above, I have been asked to provide my opinions regarding validity of the '101 Patent in connection with the *inter partes* review Petition filed by Peloton. It is my opinion that Petitioner fails to show that any of the Challenged Claims are unpatentable. To assist review, and not to limit the scope of my opinions expressed herein, I provide a high-level summary of my opinions below. I

understand that I may have an additional opportunity to offer opinions if the Petition is instituted. I reserve the right to provide additional opinions and rationale.

7. The '101 Patent discloses an innovative content delivery system directed to streaming content data at one of a plurality of bit rates. This is an approach known in the industry as adaptive bit rate streaming, which did not become widely used for content distribution until well into the 2010's. The innovative content delivery system claimed by the '101 Patent includes a code rate determining unit that is able to determine the code rate of the content data to be delivered from the server device based on an available reproduction time, which is a time available for reproducing the content based on the content data stored at the reception device and a remaining time, which is a time set at which the reception device starts reproduction of the content from a present moment. In this way, the '101 Patent provides a distribution system and method that allows for better quality of service and ensures that content is able to start on time without unnecessarily lowering the code rate (and thereby the quality of the content reproduced to the user).

8. Petitioner does not allege that any of the prior art references anticipate the invention of the '101 Patent claimed by the Challenged Claims.

9. Nor are the Challenged Claims rendered obvious by any of the prior art references, alone or in any of the combinations alleged by Petitioner. Petitioner has failed to show any working modification or combination of prior art will achieve

the '101 Patent's invention. Petitioner has also failed to identify and show any motivation to combine the cited references.

10. Accordingly, it is my opinion that all of the Challenged Claims are not unpatentable.

C. Materials Considered

11. The analysis that I provide in this Declaration is based on my education, research, and experience, as well as the documents I have considered, which are cited throughout this Declaration. In forming my opinions, I have read and considered the '101 Patent (Ex. 1001) and relevant portions of its prosecution history (Ex. 1002). I have also read and considered the Petition and exhibits thereto, including the Declaration of Clifford Reader, Ph.D., in Support of Petition for Inter Partes Review of U.S. Patent No. 8,752,101 (Ex. 1006, the "Reader Declaration") as well as the prior art references cited.

II. UNDERSTANDING OF THE LAW

12. My opinions are also informed by my understanding of the relevant law as provided by counsel, as set forth below. I understand that the patentability of a patent is analyzed on a claim-by-claim basis, from the perspective of a hypothetical person of ordinary skill in the art ("POSITA").

A. The Level of Ordinary Skill in the Art

13. I understand that this proceeding is an *inter partes* review ("IPR") proceeding before the Patent Trial and Appeal Board (the "Board"). I understand that claims

are to be construed in accordance with the ordinary and customary meaning of such claim as understood by one of ordinary skill in the art and the prosecution history pertaining to the patent.

14. When interpreting a patent, I understand that it is important to view the disclosure and the claims of that patent from a perspective of a POSITA at the time of the invention.

15. I understand that Petitioner and Petitioner's expert, Dr. Clifford Reader, assert that a POSITA as of the time of invention would have had a bachelor's degree, or equivalent, in electrical engineering, computer science, or a related field, and 2-3 years of experience researching, designing, or developing content delivery systems and related hardware, software, and firmware or equivalent experience. A person having less education but more relevant practical experience, or more education and less experience, might also meet this standard. For the purposes of this Declaration, I will apply this definition of a POSITA.

16. With respect to the '101 Patent, I understand that the time of invention is at the latest November 5, 2009, which is the earliest priority date claimed on the face of the patent. I also understand that Patent Owner may submit evidence that the date of invention for the '101 Patent may be earlier than this date. For the purposes of this Declaration, I will treat November 5, 2009, as the date of invention of the '101 Patent, though I reserve the right to modify this date as I review further evidence.

17. Based on the above definition, I possess, and at the time of invention possessed, at least ordinary skill in the art, and my qualifications and experience exceed those of a POSITA at the time of invention of the '101 Patent.

18. As such, in arriving at my opinions and conclusions in this Declaration, I have considered the issues from the perspective of a POSITA at the time of invention of the '101 Patent.

B. Prior Art

19. I understand that earlier publications and patents, which may be referred to as “prior art,” may act to render a patent unpatentable based on: (a) anticipation and (b) obviousness. I further understand that the prior art must be viewed from the perspective of a POSITA at the time of invention. I understand from counsel that the earliest priority date of the application for the '101 Patent, November 5, 2009, may be treated as the time of the invention for purposes of my analysis in this Declaration.

20. For purposes of this Declaration, I understand that the alleged “prior art” in the present Petition includes U.S. Patent Pub. No. 2006/0143678 A1 to Chou (Ex. 1004), U.S. Pat. No. 7,606,928 to Wang (Ex. 1016), and Japanese Patent Pub. No. JP2007-013705 to Nobuyoshi (original as Ex. 1009 and certified translation as Ex. 1014).

C. Obviousness

21. I understand that the prior art may render a patent claim “obvious.” Prior art references (*e.g.*, articles, patents, or other publications) that individually disclose fewer than all elements of a patent claim may nevertheless be relied upon to render a patent claim obvious if the claimed invention would have been obvious to a POSITA based on the collective teachings of the prior art and the knowledge of a POSITA at the time of invention. A patent claim is obvious if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious, at the priority date, to a POSITA to which said subject matter pertains.

22. I understand that obviousness is based on the scope and content of the prior art, the differences between the prior art and the claim, the level of ordinary skill in the art, and secondary indications of obviousness and non-obviousness. Under the doctrine of obviousness, a claim may be invalid if the differences between the invention and the prior art are such that the subject matter as a whole would have been obvious at the priority date to a POSITA.

23. I further understand that obviousness cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rationale to support the legal conclusion of obviousness. Obviousness must be established by providing a sufficient explanation of how the references may be combined, from the

perspective of one with ordinary skill in the art, to arrive at the claimed invention, and why the proffered combination accounts for all the features of each claim.

24. In particular, I understand that an obviousness theory must explain why a POSITA would have combined elements from specific references in the way the claimed invention does.

25. I understand that Petitioner has challenged the Challenged Claims of the '101 Patent as unpatentable based on three different obviousness grounds.

III. THE CHALLENGED PATENT

26. In my opinion, Petitioner fails to show that it is more likely than not that at least one of the claims is unpatentable.

A. Technical Background

27. At the time of the priority date of the '101 Patent, in November 2009, a number of problems existed in content streaming networks. There were multiple different approaches being pursued by numerous companies and research institutions. Indeed, the industry had not decided on a best solution to provide content to users. For example, there was much debate whether methods based on existing streaming protocols should be deployed or whether new approaches such as adaptive streaming should be pursued.

28. As an example, one approach to video communications was to download the entire video file and reproduce the video from the downloaded file, which is

commonly referred to as video download. (Ex. 2008, 713-714.) For instance, early forms of on-demand video delivery used a method where the video file needed to be downloaded and stored on a storage device in its entirety before it could be reproduced. (*Id.*) The disadvantage was that this required a subscriber to wait for the entire download to finish before watching the video. (Ex. 2008, 714 (“Most customers [sic] do not want to wait an hour for their ‘video on demand.’”).) Thus, this approach had very long startup times and had significant storage capacity requirements.

29. Another approach utilized transport stream protocols. (*See, e.g.*, Ex. 2009.) Transport stream protocols allowed for quicker startup times, relative to downloading the entire video, but were prone to problems due to scaling and adaptability. That is, streaming protocols at the time of the invention did not scale easily to a large number of subscribers because they required dedicated servers. Accordingly, the streaming protocols were sensitive to variable network conditions and thus prone to freezing, resulting in poor image quality and various undesirable artifacts.

30. Transport streaming applications required great communications and computing resources and were thus curtailed by computer system managers using firewalls, while also exploited by bad actors in denial-of-service attacks. (Ex. 2009, 10 (“A firewall may need to understand the SETUP method to open a ‘hole’ for the

UDP media stream.”).) Progressive video was introduced as an approach to video streaming designed to circumvent firewalls by masking video streaming as simple web browsing. (Ex. 2007, 684 (“The use of HTTP over TCP also allows the video to traverse firewalls and NATs more easily (which are often configured to block most UDP traffic but to allow most HTTP traffic).”).) In this approach, the encoded video file is divided into small segments that are stored on a web server. The receiver then makes web requests for delivery of individual segments that are then decoded and reproduced for display by the receiver. (Ex. 2007, 148 (“When a user wants to see the video, the client establishes a TCP connection with the server and issues an HTTP GET request for that URL.”).) But progressive video suffered “a major shortcoming: All clients receive the same encoding of the video, despite the large variations in the amount of bandwidth available to a client, both across different clients and also over time for the same client.” (*Id.*)

31. Progressive video served as an impetus to yet another approach to video streaming based on adaptive bitrate streaming. (Ex. 2007, 148.) In this approach, the video content was encoded at multiple bitrates and the encoded video stream was divided into multiple smaller segments, just like progressive video. (*Id.*) Individual video segments at various bitrates were selected by the receiver based on the network and buffer conditions and transmitted by the server to the receiver. (*Id.*) The ’101 Patent is directed to such adaptive bit rate streaming.

32. All of these methods had various advantages and disadvantages and had different hardware and software requirements. At the time, there were a number of considerations related to issues of network ownership, management, and availability, hardware and software requirements on content ingest and encoding, player hardware and software support, and overall system complexity. (*See, e.g.*, Ex. 2008, 526 (“Memory was once expensive but prices have fallen dramatically.”).) These concerns were exacerbated by the fact that new hardware (*e.g.*, set-top boxes, smartphones, laptops, tablets, etc.) was rapidly advancing and, as a result, each had different hardware and software constraints. (*See, e.g.*, Ex. 2008, 526 (“When buffer space no longer limits the maximum flow, another bottleneck will appear: the carrying capacity of the network.”).) The optimal approach to video streaming was not clear as all these methods posed significant challenges.

33. Adaptive bitrate streaming was still in its infancy in 2009 (when the ’101 Patent was filed), and it was not yet clear whether it would prevail as the dominant video delivery method in the industry. (Ex. 2010, Abstract (explaining that, in 2011, “Adaptive (video) streaming over HTTP [was then] gradually being adopted.”).) Indeed, at the time of the priority date, the industry had yet to adopt or perfect the nuances of the adaptive bit rate approach as indicated by a paper published nearly *two years after* the priority date of the ’101 Patent, which promotes “focus on the rate-adaption mechanisms of adaptive streaming.” (*Id.*)

34. Because of these challenges, and the nascent era of adaptive bitrate streaming, it was challenging to design a video streaming distribution system. Nonetheless, the inventors of the '101 Patent proposed a solution to stream “one content coded with any one code rate of *a plurality of code rates* different from each other,” as claimed. (Ex. 1001, Claim 1.)

B. The '101 Patent

35. The '101 Patent brings together numerous elements and methods previously unknown in the field of content streaming at the time of the invention to provide a better content distribution system. The claimed invention allows server devices to stream content to many different user devices at the best possible quality and adapt to varying network conditions and the quality of the network infrastructure that services each of the devices, while accommodating their different capabilities and minimizing any perceptible video quality impairments. Indeed, the specification of '101 Patent highlights multiple considerations of how software and hardware would need to be implemented in order to provide reliable adaptive bitrate streaming. And the claims themselves make clear that the invention was directed to a unique approach related to adaptive bit rate streaming. (Ex. 1001, Claim 1 (“[T]he transmission device being equipped with a content transmitting unit for *transmitting content data*, which is one content coded with any one code rate of a *plurality of code rates different from each other*, to the reception device[.]”) (emphasis added).)

36. The '101 Patent explains that the communication speed (*i.e.*, the amount of data that a reception device receives from a transmission device per unit time) varied depending on the status of use of a particular communication line that connected them, and that the communication line was most likely not in the transmitter or the receiver's control. (Ex. 1001, 1:54-58.) In a case where the communication speed became very low, the reception device would not start reproduction of content at the reproduction start time. (*Id.*, 1:62-64.) Nevertheless, the inventors of the '101 Patent set course to provide a solution that could adapt to all of these constraints. (*Id.*, 2:21-25 ("Accordingly, an object of the present invention is to provide a distribution system capable of solving the abovementioned problems, 'the code rate may be set to be extremely high' and 'the reception device may be unable to start reproduce content a set reproduction start time.'").)

37. To solve these problems, the '101 Patent provides a distribution system that determines the code rate using a remaining time before reproduction start time, which is set as a time at which the reception device starts reproduction of the content from a present moment, and an available reproduction time, which is a time available for reproduction of the content based on the stored data. (*Id.*, 2:39-46.) The transmission device is then able to change the code rate of the content data to be transmitted at the determined code rate in order to provide an enhanced content streaming system. (*Id.*, 2:47-49.)

38. In this way, the inventors solved a major issue in the industry and provided a system that allowed reception devices to start the reproduction of content at set reproduction times while avoiding unnecessarily lowering the code rate (and thereby the quality of the media content), and thus provided an improved content streaming system that improved customer satisfaction. (*Id.*, 4:14-17.)

IV. CLAIM CONSTRUCTION

39. Petitioner has alleged that no claim terms require construction. (Pet., 17.) I agree. Using the plain and ordinary meaning of the claim terms, it is my opinion that the prior art references do not anticipate the Challenged Claims of the '101 Patent or render the Challenged Claims obvious, either individually or in combination with each other.

V. VALIDITY OF THE '101 PATENT

A. The Challenged Claims Are Not Obvious in View of Chou (Ground 1)

40. I understand Petitioner alleges Claims 1, 2, 4, 5, 7, 11, 12, 14-18, 20-23, and 25-29 are obvious in view of Chou. (Pet., 6.)

41. Petitioner asserts Claim 1 of the '101 Patent to be obvious in view of U.S. Patent Application Pub. No. 2006/0143678 A1 ("Chou") (Ex. 1004). (Pet., §IX.A.1 (Claim 1)¹.) In my opinion, Chou does not render Claim 1 obvious. For example,

¹ The Petition appears to contain an error that caused there to be two §IX.A.1's. (*See* Pet., iii.) One is directed to Claim 1 and the second is directed to Claim 7. For the

Chou does not disclose either the “available reproduction time, which is a time available for reproducing the content based on the content data stored in the storage device of the reception device” in Claim Element [1d] or the “code rate determining unit for determining the code rates based on ... [the] available reproduction time” as claimed in Claim Element [1d] and as required by the claims.

42. Chou expressly states that it is not the actual buffer fullness that is examined, calculated, or controlled. (Ex. 1004, ¶19 (“[I]t is **not** the actual fullness of the client buffer that is controlled[.]”) (emphasis added).) The Petition cites other portions of paragraph 19 of Chou to allude that the actual fullness of the buffer is determined, but neither the Petition nor its expert reconcile Chou’s express disclosure to the contrary. (Pet., 38-39.) In my opinion, Chou’s disclosure that it is not the actual fullness of the client buffer that is controlled demonstrates the sharp differences between Chou and the ’101 Patent. (Ex. 1004, ¶19.) Moreover, in my opinion, it would not have been obvious to modify Chou to actively examine and control the actual buffer fullness of the client buffer because the algorithms disclosed by Chou are designed and tailored to avoid using such a variable. As such, in my opinion, a POSITA would not have been motivated to modify Chou to examine and control the actual buffer fullness of the client buffer and, even if a POSITA were motivated to

purposes of Claim 1, I refer to the section related to Claim 1 that begins on page 24 of the Petition.

make such a modification, it would not have been feasible without major modifications that would not be supported by the disclosure of Chou.

43. Claims 11, 16, 21, 22, 26, 27, 28, and 29 are the other independent Challenged Claims. The Petition merely cross-references its analysis of Claims 11, 16, 21, 22, 26, 27, 28, and 29 (Pet., 50-61) to Claim 1 for its allegation that Chou renders these claims obvious. In my opinion, Chou does not render Claims 11, 16, 21, 22, 26, 27, 28, and 29 obvious for the same reasons as described herein with reference to Claim 1.

1. Overview of Chou

44. Chou describes using a theory of optimal linear quadratic control for choosing the bitrate of transmitted data between a server and a client. (Ex. 1004, Abstract.) Chou does not disclose that the bitrate is determined based on an available reproduction time. To the contrary, Chou expressly states that “in the present system and process, it is *not* the actual fullness of the client buffer that is controlled, but an upper bound on the time of arrival of bits into the client buffer, to a target level. The upper bound is based on the leaky bucket model of the coding bit rate.” (Ex. 1004, ¶19 (emphasis added).)

45. Chou discloses a system where active encoding is performed and therefore requires an encoder buffer on the server and a decoder buffer on the client. (Ex. 1004, ¶60 (“[A]n encoder buffer 206 is required between the encoder 200 and the

network 204 and a decoder buffer 208 is required between the network 204 and the decoder 202, as illustrated in FIG. 2.”.) The issue that arises in Chou is that the encoder buffer 206 must never overflow or frames will be lost (and therefore never transmitted) and must never underfill (which would prevent any transmission). Accordingly, Chou’s mathematical algorithm is premised on a “leaky bucket model” that models the encoder buffer based on frames being loaded therein (*e.g.*, at a first rate) and frames drained therefrom (*e.g.*, at a second rate) and sent to the client. (Ex. 1004, ¶¶60-66.) This concern of the encoder buffer 206 and the related “leaky bucket model” are therefore used for the determination of a bound on the transmitted bitrate. (Ex. 1004, ¶70 (“By taking the leaky bucket model into account, it is possible to establish a control that allows the instantaneous coding bit rate to fluctuate naturally according to the encoding complexity of the content, within previously established bounds for a given average coding bit rate.”).)

46. The control solution disclosed by Chou sends “leaky bucket parameters” to the client to be used in determining an “optimal bit rate.” (Ex. 1004, ¶109.) Chou discloses that “the gap between a frame’s arrival time and its playback deadline is the client buffer duration at the time of the frame arrival” with reference to Figure 5. (Ex. 1004, ¶67.) But the described “gap” is a theoretical value and is not ever actually examined or used. Indeed, Chou never discloses actually examining this “gap” during operations. Rather, Chou appears to simply explain the relationship

between arriving frame and its playback time that occurs in the streaming system. Accordingly, Chou does not disclose an “available reproduction time” as recited by Claim 1. (*See infra*, §V.A.2.)

47. In addition to Chou expressly stating that the actual buffer fullness is *not* controlled, the “gap between a frame’s arrival time and its playback time” does not guarantee that there is sufficient “content data stored in the storage device of the reception device” for reproducing the content data in that time gap. Thus, even if Chou disclosed controlling the bit rate based on the determination of the “gap,” it would not preclude the possibility that the “time available for reproducing the content data stored in the storage device of the reception device” may exceed that time gap. In other words, the “gap” is not “based on the content data *stored* in the storage device of the reception device” as Claim 1 recites. (*See infra*, §V.A.2.)

48. Lastly, because Chou does not disclose “an available reproduction time” and because Chou does not disclose that the “gap between a frame’s arrival time and its playback time” is controlled, Chou also does not disclose that the code rate is determined based on such a value as required by Claim 1 and the other independent claims. (*See infra*, §V.A.3.)

2. [’101 Claim 1] Chou does not teach “an available reproduction time, which is a time available for reproducing the content based on the content data stored in the storage device of the reception device” (Claim Element [1d])

49. Element [1d] recites, in part, “an available reproduction time, which is a time

available for reproducing the content based on the content data stored in the storage device of the reception device.” In my opinion, Chou does not disclose this element.

50. The Petition discusses this element at §IX.A.1.c and alleges that “Chou teaches controlling buffer duration to a desired amount.” (Pet., 38.) Notably, the Petition only cites an expert declaration in support. (*Id.* (citing Ex. 1006, ¶150).) Yet, the cited portion of the Reader Declaration quotes a portion of paragraph 19 of Chou to reach the conclusion that “Chou examines the current buffer duration” and ignores the portion from that same paragraph where Chou expressly states that is *not* the actual fullness of the buffer that is controlled. (Ex. 1006, ¶150.) Accordingly, the expert declaration offers no more than conclusory statements that directly contradict the disclosure of Chou. In my opinion, the disclosure of Chou that states that the actual buffer fullness is not controlled is clear and the Petition’s unsupported statement is incorrect.

51. In my opinion, even if the Petition’s unsupported conclusion were accepted to be true, it would still not teach this element. The claim recites “an available reproduction time, which is a time available for reproducing the content based on *the content data stored in the storage device* of the reception device.” (Ex. 1001, Claim 1 (emphasis added).) The Petition alleges that it is the “gap between a frame’s arrival time and its playback deadline is the client buffer duration” that is being controlled. (Pet., 40 (citing Ex. 1004, ¶67).) But the value of the “gap” is not

necessarily “a time available for reproducing the content based on the content data stored in the storage device of the reception device” as required by Claim 1. That is, a value obtained by subtracting the playback time from the time of arrival is not based on the content data stored in the storage device. For example, if the current frame has arrived before earlier frames in the bitstream have arrived, the “time available for reproducing the content based on the content data stored in the storage device of the reception device” will be smaller than the “gap between a frame’s arrival time and its playback time.” Similarly, if the current frame has arrived after future frames in the bitstream have arrived, the “time available for reproducing the content based on the content data stored in the storage device of the reception device” will be larger than the “gap between a frame’s arrival time and its playback time.” Therefore, even if the “gap between a frame’s arrival time and its playback time” was calculated (it is not), it is still not a “time available for reproducing the content based on the content data stored in the storage device of the reception device,” as required by Claim 1.

52. In an attempt to remedy this deficiency, the Petition relies only on the Reader Declaration for support that the difference in the playback deadline and arrival time teaches “an available reproduction time, which is a time available for reproducing the content based on the content data stored in the storage device of the reception device.” (Pet., 38-40 (citing Ex. 1006, ¶¶150-153).) Yet, the declaration does not

provide any reasoning that reconciles the issues of Chou's contrary disclosure with the conclusory positions of the Petition. (Ex. 1006, ¶¶150-153.) Instead, the Reader Declaration merely repeats the conclusions of the Petition *verbatim*. (*Id.*; Pet., §IX.A.1.c.)

53. Accordingly, Chou fails to disclose “an available reproduction time” as claimed.

3. [’101 Claim 1] Chou does not teach “a code rate determining unit for determining the code rate based on ... an available reproduction time, which is a time available for reproducing the content based on the content data stored in the storage device of the reception device.” (Claim Element [1d])

54. Element [1d] recites, in part, “a code rate determining unit for determining the code rate based on ... an available reproduction time, which is a time available for reproducing the content based on the content data stored in the storage device of the reception device.” In my opinion, Chou does not disclose this element.

55. The Petition discusses this element in §IX.A.1.c and is deficient for at least the reasons described with reference to the “available reproduction time” above. (*See supra*, ¶¶49-53.) That is, because Chou fails to disclose “an available reproduction time,” it also fails to disclose “determining the code rate based on” that “available reproduction time.”

56. To support its allegation that Chou discloses this element, the Petition states, “[t]hus, Chou examines the current buffer duration to determine whether arrival of

a subsequent frame needs to be accelerated (increasing buffer duration) or delayed (decreasing buffer duration).” (Pet., 39.) Notably, this conclusion does not have any citations and appears to be based on the previous unsupported conclusion that Chou “teaches controlling buffer duration to a desired amount[,]” which as explained above, is directly contrary to the disclosure of Chou. (*Id.*, 38.) In particular, the Petition quotes paragraph 19 of Chou where it states, “coding bit rate control is formulated as a standard problem ... in which the client buffer duration is controlled as closely as possible to a target level[,]” as allegedly supporting its conclusion that Chou discloses controlling the actual buffer duration. (Pet., 38-39 (citing Ex. 1004, ¶19).) But as discussed above, paragraph 19 of Chou expressly states “that in the present system and process, it is **not** the actual fullness of the client buffer that is controlled, but an upper bound on the time of arrival of bits into the client buffer, to a target level. The upper bound is based on the leaky bucket model of the coding bit rate.” (Ex. 1004, ¶19 (emphasis added).) For this reason, it is my opinion that Chou does not disclose “determining the code rate” based on the “available reproduction time” that is based on the content data stored in the storage device, as Claim 1 recites.

57. In my opinion, the Reader Declaration does not provide any reasoning that would support the Petition’s unsupported conclusions that are contrary to the disclosure of Chou. For example, the Reader Declaration merely quotes the same paragraphs of Chou that the Petition does and does not provide any reasoning that

could reconcile Chou's statements in the same paragraph to which the declaration and Petition cite. (Ex. 1006, ¶¶149-150.) Instead, the Reader Declaration merely repeats the contents of the Petition, which is also devoid of any rationale that could support a conclusion that Chou discloses, teaches, or suggests an element that it expressly disavows. To the contrary, not only does Chou *not* disclose "determining a code rate ... based on ... the available reproduction time," it expressly suggests that doing so should not be done.

58. Accordingly, in my opinion, Chou fails to disclose this element of Claim 1. Additionally, in my opinion, the Petition fails to provide any rationale as to why Chou could render Claim 1 obvious. For these reasons, it is my opinion that Chou does not render Claim 1 obvious.

4. *Dependent Claims 2, 4, 5, and 7 Are Not Obvious In View of At Least Their Dependence from Claim 1*

59. Each of Claims 2, 4, 5, and 7 depend, directly or indirectly, from Claim 1 of the '101 Patent. As discussed above, Chou fails to disclose each and every element of Claim 1 of the '101 Patent. (*See supra*, §§V.A.2-3.)

60. As such, it is my opinion that Petitioner has failed to demonstrate that Claims 2, 4, 5, and 7 are obvious in view of the cited references.

5. *Claims 11, 12, 14-18, 20-23, and 25-29 Are Not Obvious In View of the Cited Art*

61. Claims 11, 16, 21, 22, 26, 27, 28, and 29 are each independent and each recite

(as shown below) at least one element which, as discussed above, is not disclosed, taught, or suggested in the cited art relied upon by Petitioner. (*See supra*, §§V.A.2-3.)

62. These two elements, repeated substantively identically in each of Claims 11, 16, 21, 22, 26, 27, 28, and 29, differentiate each claim from the cited art, as discussed above with respect to Claim 1. (*See supra*, §§V.A.2-3.) For each of these independent claims, the Petition merely cites back to Claim 1. (Pet., 50-60².) Each of Claims 12, 14, 15, 17, 18, 20, 23, and 25 depend, directly or indirectly, from a respective independent Claim 11, 16, or 21 and therefore it is my opinion that Petitioner has failed to demonstrate these claims are obvious in view of Chou.

63. As such, it is my opinion that Petitioner has failed to show that the Challenged Claims are obvious in view of Chou.

B. Claims 1, 2, 4, 5, 7, 11, 12, 14-18, 20-23, and 25-29 Are Not Obvious in View of Chou and Wang (Ground 2)

1. Overview of Wang

64. Wang is directed to embodiments deploying real-time transport protocol (RTP). (Ex. 1016, Abstract.) As background, RTP is a transport-layer protocol (typically running over user datagram protocol (UDP) or transport control protocol

² The section numerals in the Petition that correspond to the other claims repeat section numerals corresponding to other claims. (*See* Pet., iii (listing §IX.A.1-4 multiple times).) For this reason, I refer not to the relevant section numerals, but instead to the page numbers to avoid confusion.

(TCP) that send messages between devices over Internet protocol (IP) networks) and is commonly used for streaming applications such as, for example, voice-over-IP (VoIP). (Ex. 2004; *see also* Ex. 2005.) RTP streams consist of packets that carry media content (*e.g.*, audio and video), each having a sequence number and a timestamp. (Ex. 2004, 4.) The sequence number is a binary number that allows the receiver to reorder the packets upon arrival and thus accommodate out-of-order delivery of packets. (*Id.*, 4-6, 14.) The timestamp allows the receiver to present the packets in the appropriate order to the media player for decoding and display as well as to synchronize multiple media streams such as, for example, audio and video streams. (*Id.*, 14-16.) RTP is used in conjunction with real-time transport control protocol (RTCP), which is used to monitor transmission quality parameters by having the receiver send periodic reports containing statistics and control information regarding the media stream carried by the RTP (*e.g.*, packet count, packet loss, packet delay variation, round-trip delay, etc.). (Ex. 2005, 40.) RTCP reports can be used by the sender to improve the media streaming quality including the delay and jitter of the media stream as well as multiple media stream synchronization. (*Id.*, 40-46.)

65. Wang discloses a modification of RTCP packets that includes “receiver buffer information.” (Ex. 1016, 4:64-67.) The new RTCP packet proposed by Wang includes information that is indicative of any sequence number of a packet within

the receiver's buffer and the time difference between the current time and the scheduled playout time of that packet. (Ex. 1016, Abstract.) Wang then suggests that this information can be used to calculate the current actual receiver buffer fullness level by calculating the time difference between the current time and the scheduled playout time of the last packet within the receiver buffer. (Ex. 1016, 3:48-55.) Wang discloses that this is necessary because in the prior art, "there are no mechanisms to prevent the incorrect assumptions from happening and to eliminate the difference between the actual fullness level and the server assumed fullness level in the receiver buffer." (Ex. 1016, 2:4-7.) In particular, Wang describes the problem that "when the server executes the rate adaptation operations relying on the assumed receiver buffer fullness level, underflow or overflow in the receiver buffer may occur." (Ex. 1016, 1:67-2:3.)

66. It is important to note that RTP/RTCP is a transport-layer protocol and is thus assumed to operate independently of application-layer systems such as media encoders and decoders.³ Transport-layer protocols are distinct from higher-layer

³ RTP packets are often prepared at the application layer for delivery by transport-layer protocols such as UDP and TCP in a mechanism that is sometimes referred to as application-layer framing because the application (as opposed to the protocol stack in the operating system) is cognizant of the semantics required to segment the data into packets. Nonetheless, the RTP/RTCP packets are transport-layer protocols and network protocol design practices based on the OSI Reference Model (such as the popular TCP/IP model) mandate that the protocols and applications at each layer operate independently while only providing interfaces to other layers to allow for efficiency and modularity in network system design.

applications provided by coding standards (*e.g.*, H.263, H.264) that designate the coding schema of the underlying data carried by RTP packets. (*See, e.g.*, Ex. 2006, 295.)

67. As the Petition acknowledges, “Wang discloses adjusting ‘the transmission rate and/or nominal playout rate ... to maintain the receive[r] buffer fullness level[.]’” (Pet., 62 (citing 1016, 7:13-18).) The “transmission rate” is the number of packets that the sender sends per unit of time, which is independent of the characteristics of the data (*e.g.*, code rate) that is encapsulated by the packet. The transmission rate therefore refers to the rate of packet transmission, not to changes to the code allowing for distinct code rates as required by the Challenged Claims of the ’101 Patent. The “nominal playout rate” is the rate the receiver reproduced the content per unit of time. The nominal playout rate therefore refers to the rate of packet reproduction at the receiver and is unrelated to changes to the code allowing for distinct code rates as required by the Challenged Claims of the ’101 Patent. Neither the transmission nor playback rates suggest determining or changing *a code rate* of the underlying data carried by RTP packets.

68. As stated above, the new RTCP packet proposed by Wang includes the time difference between the current time and the scheduled playout time of that packet, which Wang suggests can be used to calculate the current actual receiver buffer fullness level by calculating the time difference between the current time and the

scheduled playout time of the last packet within the receiver buffer. (Ex. 1016, 3:48-55.) However, Wang fails to teach “an available reproduction time” because the calculated time difference would not be “an available reproduction time, which is a time available for reproducing content” as required by Claim 1, as the Petition itself demonstrates (*see infra*, ¶88) and for similar reasons described with reference to the “gap” in Chou (*see supra*, §V.A.2). In particular, simply knowing the “time difference between the current time and the scheduled playout time of the last packet within the receiver buffer” does not guarantee that there is sufficient “time available for reproducing content based on the content data stored in the storage device of the reception device” in that time difference. Nor does knowing the “time difference between the current time and the scheduled playout time of the last packet within the receiver buffer” preclude the possibility that the “time available for reproducing the content data stored in the storage device of the reception device” may exceed that time difference.

69. Accordingly, Wang offers no solution that is analogous to determining a bitrate at all much less via using a remaining time and an available reproduction time that is based on the underlying content data in the storage device of the receiver.

2. Motivation to Combine Chou with Wang

70. The Petition discusses the alleged motivation to combine Chou (directed to an active encoding application) and Wang (directed to a transport-layer streaming

protocol) in §IX.D.1, but a POSITA would not have been motivated to combine these two references because (1) Chou discloses that it is not the actual buffer fullness that is controlled by the disclosed algorithm and thus teaches that the actual buffer fullness level should not be controlled even if it were allegedly proposed by Wang (which it is not); and (2) Wang and Chou are directed to different technologies—active encoding applications and transport-layer protocols, respectively—within the broad field of multimedia systems that are deployed at different network layers and operate independently to preserve efficiency and modularity in network system design. (Ex. 2006, 295 (depicting encoding standards isolated from RTP in a network stack); Pet., 68-75.)

71. The Petition does not discuss how or why a POSITA would have combined Chou and Wang. The Petition discusses an abstraction of Chou and Wang and concludes that they both “manage buffer duration/fullness (based on time) in order to prevent buffer underflow[.]” (Pet., 69.) The Petition then concludes Chou and Wang “both measure similar buffer characteristics to the ’101 Patent[.]” (Pet., 70.) Yet, as discussed above, Chou expressly states this is incorrect. (*See supra*, ¶44.) The Petition provides no rationale for these conclusions and does not discuss how these conclusions would provide motivation to a POSITA. The Petition then continues to allege that Chou and Wang “both disclose controlling [the] code rate to control buffer duration/fullness to prevent buffer underflow” and that a “POSITA

would have been motivated” to combine them. (Pet., 72-73.) But the Petition does not explain what the proposed modifications would be, why, or how a POSITA could have combined them. In my opinion, a POSITA would not have combined Chou and Wang.

72. From the Petition itself, it is not clear what element from Wang Petitioner is alleging could or should be incorporated into Chou. For example, it is unclear whether the Petition is arguing that Wang could theoretically be combined with Chou to remedy the entire deficiency of Chou’s failure to disclose Claim Element [1d] or if the Petition is arguing that Wang could be combined with Chou to remedy only a portion of Claim Element [1d]. (Pet., §IX.D.1.) As such, the Petition fails to articulate what combination it is proposing and is therefore deficient. The Petition does no more than simply point to various independent elements in Wang and Chou without identifying what is to be modified.

73. The rationale provided by the Petition appears to use the ’101 Patent as a road map. Indeed, the focus of the arguments is on the independent elements of Chou and Wang and how they independently compare to the ’101 Patent. For example, the Petition alleges that “Chou and Wang both measure similar buffer characteristics to the ’101 Patent” and “Chou and Wang both disclose controlling code rate to control buffer duration/fullness to prevent buffer underflow[.]” (Pet., §IX.D.1.b-c.) But these general statements about alleged features from two different references is

not sufficient to show how (or why) a POSITA would have been motivated to combine these references. To the contrary, because according to Petitioner both references allegedly disclose the same elements (*i.e.*, calculate the buffer fullness to control the code rate so as to prevent buffer underflow), in my opinion, under this rationale, a POSITA would not have been motivated to combine these references at all.

74. Regardless of the generalizations made of the references in the Petition that fail to point out what elements Petitioner suggests should be combined, I have been asked to assume that the Petition's recitation that "a POSITA would have been motivated to use the buffer characteristics measurements disclosed in Wang as a basis for Chou to determine whether, and how much of, a code rate change is required" means that the Petition is arguing that Chou fails to disclose "a remaining time" and "an available reproduction time" as recited in Claim Element [1d] after the word "determining" and is instead relying on Wang for these elements. (Pet., 74-75.) However, even after making this assumption, in my opinion, the Petition still does not provide a motivation to combine Chou and Wang because it fails to articulate beyond conclusory statements how and why the references would have been combined or explain that a POSITA would have had a reasonable expectation of success in doing so.

75. First, the Petition fails to explain how a POSITA would have substituted or

supplemented the proposed “linear quadratic formula” disclosed by Chou (which specifically proclaims that “it is not the actual fullness of the client buffer that is controlled”) with the elements from Wang. (Ex. 1004, ¶19.) To the contrary, the “linear quadratic formula” that utilizes the “leaky bucket model” would not (and could not) accept the elements of Wang without substantial changes. That is, because Chou discloses that a variable that represents the actual buffer fullness is never determined or utilized, it is unclear how the algorithm could operate if such variable were now introduced. Neither the Petition nor the Reader Declaration provide an explanation for this. Indeed, modifying the algorithm of Chou in such a way could not be accomplished without undue experimentation. Moreover, by substituting the alleged elements from Wang into Chou, the entire purported novelty of Chou would be lost because Chou would now need to control the buffer fullness level when it expressly taught that “it is not the actual fullness of the client buffer that is controlled” by the “linear quadratic formula.” (Ex. 1004, ¶19.)

76. Accordingly, in my opinion, there would be no reasonable expectation of success even if a POSITA were to attempt to combine the references. Indeed, the Petition and the Reader Declaration do not provide rationale that there would be reasonable expectation of success. As discussed above, such a combination would rest on a modification to the novel algorithm of Chou that would change the principle of operation of Chou and would not be possible without significant effort and

experimentation.

77. Second, Petitioner fails to articulate a reason why a POSITA would have combined the prior art references. That is, the Petition fails to reconcile Chou's statements saying that it is not the actual buffer fullness that is controlled with its allegation that a POSITA would have wanted to utilize the actual buffer fullness to achieve the same goal. In my opinion, for this reason alone, a POSITA would not have been motivated to combine the references because adding a new variable that required feedback from the client device would make the system more cumbersome and complex.

78. Moreover, Wang is not directed to an encoding scheme that would allow for a code rate to be selected and changed, and the Petition does not explain why or how the network architecture would be modified to include the modified RTCP packets of Wang in the schema of Chou. That is, Wang is directed to a transport-layer streaming protocol that resides in a different network layer than the active coding application techniques disclosed by Chou and the Petition fails to explain why a POSITA would have combined them. In my opinion, a POSITA would have been motivated not to combine these references as these functionalities operate independently at distinct network-layer systems and combining them would not preserve the efficiency and modularity of the system in accordance with common practices in network system design. This is a particularly problematic deficiency

because Wang does not disclose, teach, or even suggest that the code rate of the underlying data is of any concern. Instead, Wang suggests only adjusting the transmission rate, which is either going to slow down or speed up the number of packets transmitted over a period of time and not change the code rate of the underlying content. (*See supra*, §V.B.1.)

79. Accordingly, in my opinion, the Petition fails to show that Claim 1 of the '101 Patent is obvious over a combination of Chou and Wang.

3. ['101 Claim 1] Wang does not teach “an available reproduction time, which is a time available for reproducing the content based on the content data stored in the storage device of the reception device” (Claim Element [1d])

80. Element [1d] recites, in part, “an available reproduction time, which is a time available for reproducing the content based on the content data stored in the storage device of the reception device.” In my opinion, Chou does not disclose this element.

81. The Petition maps Wang’s disclosure of the variable “Tlast”, which is the “time difference between the current time and the scheduled playout time” of the last packet in the buffer, to an “available reproduction time.” (Pet., 62.) That is, the value of the time difference between the current time and the scheduled playout time of the last packet in the buffer is not necessarily an available reproduction time that “is a time for reproducing the content.” For example, if the current last packet has arrived before earlier packets in the bitstream have arrived, the “time available for reproducing the content based on the content data stored in the storage device of the

reception device” will be smaller than the “time difference between the current time and the scheduled playout time of the last packet in the buffer.” In other words, because RTP does not require that packets arrive in order, some packets may be lost or delayed, or some may arrive in a different order than the order they were transmitted and the technique of Wang does not account for packets that have actually been received and stored in the storage device of the client. Similarly, if the current last packet has arrived after other packets in the bitstream have arrived, the “time available for reproducing the content based on the content data stored in the storage device of the reception device” will be larger than the “time difference between the current time and the scheduled playout time of the last packet in the buffer.” Further, the “time difference between the current time and the scheduled playout time of the last packet in the buffer” is only transmitted during periodic RTCP reports in the modified RTCP protocol of Wang and therefore will not represent “a time available for reproducing the content based on the content data stored in the storage device of the reception device” as a result of transmission delay. Moreover, as explained in greater detail below, the Petition itself demonstrates why T_{last} is *not* the “available reproduction time.” (*See infra*, ¶88.) For all these reasons, the “time difference between the current time and the scheduled playout time of the last packet in the buffer” is not “an available reproduction time, which is a time for reproducing the content based on the data stored in the storage device,” as required

by Claim 1.

82. Accordingly, in my opinion, Wang does not disclose “an available reproduction time” as claimed.

4. [’101 Claim 1] Wang does not teach “a code rate determining unit for determining the code rate based on a remaining time before reproduction start time... and based on an available reproduction time,” (Claim Element [1d])

83. Element [1d] recites, in part, “a code rate determining unit for determining the code rate based on a remaining time before reproduction start time... based on an available reproduction time.” Petitioner identifies Wang generally as disclosing this element. (Pet., §IX.B.1.) In my opinion, Wang does not disclose such element.

84. First, the Petition is deficient in its support and reasoning. The Petition maps Wang’s disclosure of the variable “Tx”, which is the “time difference between the current time and the scheduled playout time” of packet “x” to the “remaining time” of Claim 1. (Pet., 62.) The Petition also maps that same variable “Tlast”, when packet “x” corresponds to the last packet in the buffer, to the “available reproduction time.” (Pet., 63.) The Petition then cites Wang as allegedly disclosing “adjusting ‘the transmission rate and/or the nominal playout rate of the different media to maintain the receive[r] buffer.’” (Pet., 62 (quoting Ex. 1016, 7:13-20).) As a threshold matter, the variable “Tlast” is not “an available reproduction time” for the reasons stated above. (See *supra*, §V.B.3; see also *infra*, ¶88.) Therefore, Wang cannot disclose that anything is determined based on “an available reproduction

time.”

85. Second, the Petition conclusory alleges that Wang discloses a “code rate determining unit for determining the code rate.” (Pet., §IX.B.1.) Wang does not disclose such an element. The Petition repeatedly states that Wang discloses adjusting the “transmission rate” or the “nominal playout rate.” (Pet., 62-65.) But these rates are not “code rate[s]” as recited in Claim 1. Instead, the “transmission rate” refers to the rate of packet transmission, not to changes to the code allowing for distinct code rates as required by the Challenged Claims of the ’101 Patent. The nominal playout rate refers to the rate of packet reproduction at the receiver and is unrelated to changes to the code allowing for distinct code rates as required by the Challenged Claims of the ’101 Patent. Neither the transmission nor playback rates suggest determining or changing *a code rate* of the underlying data carried by RTP packets.

86. As discussed above, Wang discloses that the invention is used in conjunction with an RTP media stream. (Ex. 1016, 2:50-53.) RTP is a transport-layer protocol that carries media stream segments in packets over transport protocols such as UDP or TCP. Media coding is performed by higher-level application systems (*i.e.*, encoder) and a POSITA would thus not have understood the “transmission rate” or the “nominal playout rate” to have any determination of the code rate of the underlying media content. The Petition cites a portion of Wang for this allegation

that states, in full, “[f]or example, the server can change the transmission characteristic by bitstream switching, transmission rate decoupling where the transmission rate is different from the designated rate in order to increase or decrease the receiver buffer level.” (Pet., 63 (quoting Ex. 1016, 6:31-35).) But, this does not disclose that a code rate of the underlying data is determined because it only discusses the transmission characteristics and not the characteristics of the data (*e.g.*, code rate) that is being transmitted. In fact, to the extent that the “designated [transmission] rate” refers to the code rate of the bitstream, this portion of Wang specifically teaches that the code rate remains unchanged and it is only the transmission rate that is adjusted. Notably, Petitioner relies on its expert to fill this gap. (Pet., 63 (citing Ex. 1006, ¶253).) Yet, the Reader Declaration does no more than allege generally that Wang discloses “changing the transmission characteristic” and that “[t]hese transmission characteristics include changing the code rate.” (Ex. 1006, ¶253.) This conclusory statement is not sufficient. Petitioner’s attempt to extrapolate the teachings of Wang are unfounded and not applicable to the general transport-layer protocol transmission that Wang discusses. Wang itself discloses that the variable Tlast is intended to be used to cause changes to the transmission rate or the nominal playout rate, or to “synchronize” a clock of a remote camera live streaming to a clock receiving the live stream at the studio. (Ex. 1016, 7:50-55.) Notably, Wang never suggests that a code rate of the media content can be changed.

Accordingly, Wang fails to disclose a “code rate determining unit for determining the code rate.”

87. The Petition also presents a different theory via a hypothetical situation created by Petitioner. (Pet., 64-65.) This theory only includes two citations to the Wang reference and the remainder of the theory either includes no citation or only cites to the expert declaration. The entire theory is conjecture made up by Petitioner and its expert. It simply is unfounded. The assumptions make the entire hypothetical scenario nonsensical. For example, Petitioner argues that “‘Tfirst’, which corresponds to ‘the time difference between the current time and the scheduled playout time of’ the first packet” can be mapped to the “remaining time” of Claim 1 to determine a code rate in a device that has yet to begin playback. (Pet., 64.) Yet, four sentences later, the Petition instructs the reader to “assume that playback is set to begin when eight packets are received in the buffer” without ever explaining how “Tfirst” could be calculated if the beginning of the playback for the first packet depends on having already received eight packets. “Tfirst” could not possibly be calculated in this scenario because “Tfirst” corresponds to playout time (*e.g.*, end of playback) of the first packet when that playout time is unknown until eight packets have been received at the buffer.

88. Additionally, accepting the assumptions presented by the hypothetical, the Wang reference itself contradicts the conclusions made in the Petition and

demonstrates why Tlast is not the claimed “available reproduction time.” For example, the Petition states, “Wang teaches that ‘the current actual receiver buffer fullness level’ can be calculated, which would be calculated to be five seconds (i.e., five packets in the buffer at one second of playback time each).” (Pet., 64-65.) But this is incorrect. Wang discloses that Tlast would be equal to the *playout* time of the last packet from the current time. (Pet., 63 (citing Ex. 1016, 5:20-24, 5:35-37, 5:57-59).) Thus, in the hypothetical given, if the playback of the first packet (which the Petition asks us to assume) begins three seconds from now, and there are five packets in the buffer (which the Petition again asks us to assume), the time calculated for *playout* of the last packet (i.e., packet number five) would be *eight* seconds (i.e., five seconds of buffer time plus three seconds before buffer playout begins) and *not five* seconds as the Petition alleges. (Pet., 64-65.) This is an example of exactly the issue I highlighted regarding why Tlast is not the “available reproduction time.” (See *supra*, §V.B.3.) Indeed, as Petitioner’s *own* hypothetical shows, Tlast is not necessarily the “available reproduction time.” And for these reasons, in my opinion, Wang does not disclose “determining a code rate” based on an “available reproduction time,” as required by Claim 1.

89. Accordingly, not only does the hypothetical example provided in the Petition *not* remedy Wang’s deficiencies described above, it demonstrates why Wang does not disclose these elements.

90. Thus, in my opinion, Wang fails to disclose Claim Element [1d].

5. Dependent Claims 2, 4, 5, and 7 Are Not Obvious In View of At Least Their Dependence from Claim 1

91. Each of Claims 2, 4, 5, and 7 depend from Claim 1 of the '101 Patent. As discussed above, Petitioner has failed to submit adequate evidence showing a motivation to combine Chou and Wang as proposed. (*See supra*, §V.B.2.) Further, and as discussed above, even if the references are combined as proposed, this combination fails to disclose each and every element of Claim 1 of the '101 Patent. (*See supra*, §§V.B.3-4.)

92. As such, it is my opinion that Petitioner has failed to demonstrate that Claims 2, 4, 5, and 7 are obvious in view of the cited references.

6. Claims 11, 12, 14-18, 20-23, and 25-29 Are Not Obvious In View of the Cited Art

93. As discussed above, each of Claims 11, 16, 21, 22, 26, 27, 28, and 29 are independent and each recites (as shown below) at least one element that, as discussed above, is not disclosed, taught, or suggested in the cited art relied upon by Petitioner. (*See supra*, §§V.B.3-4.)

94. These elements, repeated substantively identically in each of Claims 11, 16, 21, 22, 26, 27, 28, and 29, differentiate each claim from the cited art, as discussed above with respect to Claim 1. (*See supra*, §§V.B.3-4.) For each of these independent claims, the Petition merely cites back to Claim 1. (Pet., 65.) Claims

12, 14, 15, 17, 18, 20, 23, and 25 depend, directly or indirectly, from a respective independent Claim 11, 16, or 21 and therefore it is my opinion that Petitioner has failed to demonstrate these claims are obvious in view of Chou and Wang.

63. As such, it is my opinion that Petitioner has failed to show that the Challenged Claims are obvious in view of Chou and Wang.

C. Claims 5, 7, and 15 Are Not Obvious in View of Chou and Nobuyoshi (Ground 3)

95. In addition to the above, Petitioner also alleges that Claims 5, 7, and 15, which depend from Claims 1 and 11, are obvious in view of Chou combined with Nobuyoshi.

1. Overview of Nobuyoshi

96. Nobuyoshi is a Japanese Patent that is discussed in the background of the '101 Patent and cited on the face of the '101 Patent. (Ex. 1001, Cover.) Nobuyoshi states that its problem to be solved is “[t]o provide a technology whereby a terminal can take a midway participation in the simultaneous playback processing among the other terminals while the other terminals share data and simultaneously reproduce the shared data.” (Ex. 1014, Abstract.) As the '101 Patent itself explains, Nobuyoshi discloses “a system that allows a plurality of reception devices to synchronously reproduce content even if time to start reproduction of the content varies depending on the reception device. In this distribution system, while a first reception device is reproducing content, a second reception device estimates a time required to start

reproduction of the content and determines reproduction start time based on the estimated time. Then, the second reception device transmits the determined reproduction start time to the transmission device.” (Ex. 1001, 1:33-41.)

2. Claims 5, 7, and 15 Are Not Obvious in View of Chou combined with Nobuyoshi

97. Each of Claims 5, 7, and 15 depend from either Claim 1 or Claim 11. As discussed above, Petitioner has failed to show that Claim 1 or Claim 11 are obvious in view of Chou. (*See supra*, §§V.A.2-3, V.A.5.) As such, Claims 5, 7, and 15, which depend from these claims, are valid at least because of their dependence from those claims.

98. Nobuyoshi was considered at the time the ’101 Patent was prosecuted as evidenced by Nobuyoshi’s citation on the face of the patent. Nobuyoshi is relied on in combination with Chou as allegedly disclosing Claims 5, 7, and 15. (Pet., §IX.C.) The Petition does not allege that Nobuyoshi remedies the deficiencies of Chou as they relate to Claim Element [1d] discussed above. Indeed, as evidenced by the Examiner’s consideration of Nobuyoshi during prosecution, it does not disclose, teach, or suggest the elements of Claim 1 (or the other independent claims).

VI. RIGHT TO SUPPLEMENT

99. My opinions relating to the validity of the Challenged Claims of the ’101 Patent are addressed in this Declaration. This Declaration is based on the information presently available to me. To the extent any additional information is

provided at a later time, I reserve the right to amend or supplement this Declaration based on that information.

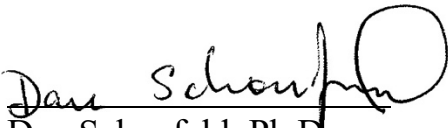
100. I reserve the right to supplement my opinions in light of any responsive opinions or critique from or on behalf of Petitioner.

101. I reserve the right to augment or modify these opinions if additional information becomes available, in response to potential institution by the Board, and/or in rebuttal to positions taken by Petitioner.

VII. CONCLUSION

102. For the reasons set forth herein, I am of the opinion that all of the Challenged Claims are not unpatentable.

I hereby declare under penalty of perjury under the laws of the United States of America that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true, and further, that these statements are made with the knowledge that willful false statements and the like so made are punishable by fine, imprisonment, or both, under 18 U.S.C. § 1001. I attest to having a final and complete copy of this Declaration before me at the time I add my signature.


Dan Schonfeld, Ph.D.

December 5, 2023
Date