

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 8,752,101

PATENT OWNER'S RESPONSE

LIST OF EXHIBITS	
Exhibit	Description
2001	Declaration of Daniel Schonfeld, dated December 5, 2023
2002	Curriculum Vitae of Dr. Daniel Schonfeld
2003	Peloton's Disclosure of Terms and Constructions
2004	H. Schulzrinne et al., RTP: A Transport Protocol for Real-Time Applications, RFC 3550, July 2003
2005	D. Schonfeld, "Video Communication Networks," (Invited Chapter), <i>Handbook of Image and Video Processing. Second Edition</i> . A. Bovik (ed.), Academic Press: San Diego, California, Chapter 9.3, pp. 1031-1064, 2005
2006	H.323: Packet-based multimedia communications systems, Nov. 1996
2007	Kurose, James F., and Keith W. Ross, <i>Computer Networking: A Top-down Approach</i> . 2017.
2008	Tanenbaum, Andrew S., and David Wetherall, <i>Computer Networks</i> . Prentice Hall, 2011
2009	H. Schulzrinne et al., Real-Time Streaming Protocol (RTSP), RFC 2326, 1998.
2010	S. Akhshabi et al., "An Experimental Evaluation of Rate-Adaption Algorithms in Adaptive Streaming over HTTP," <i>Proc. 2011 ACM Multimedia Systems Conf.</i>
2011	U.S. Patent No. 6,370,688 (Hejna)
2012[NEW]	Declaration of Dr. Jeremy Cooperstock, dated May 31, 2024
2013[NEW]	Declaration of Dr. Kevin C. Almeroth Regarding Claim Construction
2014[NEW]	Joint Claim Construction Brief Filed in Related Delaware District Court Case (JCC)
2015[NEW]	Deposition Transcript of Clifford Reader, PH. D.

TABLE OF CONTENTS

	Page
I. Introduction.....	1
II. Dr. Reader’s Opinions Are Unreliable	3
III. The Cited References.....	6
A. Chou teaches techniques for controlling the coding bit rate based on a linear quadratic control technique and leaky bucket model (Ground 1).....	6
B. Wang teaches a modified RTCP packet for use in RTP protocols (Ground 2).....	11
C. Nobuyoshi teaches techniques for terminals to join a playback session midway through a stream (Ground 3).....	11
IV. Claim Construction	11
V. Level of Ordinary Skill in the Art.....	12
VI. Petitioner fails to show that limitation 1[d] was obvious.....	12
A. The claims require the available time and remaining time to be values that are used as the basis for the determination of the code rate.	12
1. The ’101 Patent Confirms That “Based On” Means that a Value of “the available reproduction time” and “remaining time” are used in the Determination.	15
B. Ground 1 – Chou fails to render obvious “determining the code rate ... based on the available reproduction time” for several reasons.	17
1. Chou’s “target buffer duration” does not render obvious “determining the code rate ... based on the available reproduction time”	19
2. Chou’s “gap between a frame’s arrival schedule and its playback deadline” does not render obvious “determining the code rate ... based on the available reproduction time”	25
3. Chou’s disclosed method of controlling the upper bound does not suggest “determining the code rate ... based on an available reproduction time”	34
4. Chou teaches away from using the “client buffer duration” as an input to determining the code rate	35

C.	Ground 1 – <i>Chou</i> fails to render obvious “determining the code rate based on a <i>remaining time</i> before reproduction start time ...”	41
1.	<i>Chou</i> ’s “target buffer duration” is not a “remaining time”	42
D.	Ground 2 – <i>Wang</i> does not cure the deficiencies of <i>Chou</i>	47
1.	<i>Wang</i> Overview.....	47
2.	The Petition’s arguments for motivations to combine fail because they are conclusory and change the principle of operation of the underlying references.....	48
3.	<i>Wang</i> fails to teach “determin[ing] the code rate based on a remaining time ... and based on an available reproduction time”	55
4.	<i>Wang</i> does not teach “determining the code rate based on a remaining time before reproduction start time... and based on an available reproduction time” (claim element [1d]).....	59
E.	Ground 3- <i>Nobuyoshi</i> does not cure the deficiencies of <i>Chou</i>.....	62
F.	Claims 11, 16, 21, 26, 27, 28, and 29 along with their respective dependent claims are not obvious in view of the cited art.....	62
VII.	Conclusion	63

TABLE OF AUTHORITIES**Page(s)****CASES**

<i>Bettcher Indus., Inc. v. Bunzl USA, Inc.</i> , 661 F.3d 629 (Fed. Cir. 2011)	32
<i>In re Magnum Oil Tools Int'l, Ltd.</i> , 829 F.3d 1364 (Fed. Cir. 2016)	18
<i>In re Ratti</i> , 270 F.2d 810 (C.C.P.A. 1959)	52, 53
<i>K/S HIMPP v. Hear-Wear Technologies, LLC</i> , 751 F. 3d 1362 (Fed. Cir. 2014)	6, 7, 8
<i>Metalcraft of Mayville, Inc. v. Toro Co.</i> , 848 F. 3d 1358 (Fed. Cir. 2017)	50, 51, 52
<i>Ruiz v. A.B. Chance Co.</i> , 357 F.3d 1270 (Fed. Cir. 2004)	4
<i>SAS Institute, Inc. v. Iancu</i> , 138 S. Ct. 1348 (2018).....	18, 19, 36, 38, 39, 40

STATUTES

35 U.S.C. §103.....	6
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I. Introduction

Petitioner fails to establish that the claims of U.S. Patent No. 8,752,101 (the “101 Patent”) are invalid. Specifically, Petitioner fails to show that U.S. Patent Application Pub. No. 2006/0143678 A1 (“*Chou*”) (EX1004) alone, or in combination with U.S. Pat. No. 7,606,928 (“*Wang*”) (EX1016) or Japanese Pub. No. JP2007-013705 (“*Nobuyoshi*”) (EX1009, EX 1014) render the challenged claims obvious. Pet., 6.

Each of the challenged claims require determining the code rate based on two variables: (i) a “remaining time before reproduction start time,” which is “set as time at which the reception device starts reproduction of the content from a present moment” (herein “remaining time”); and (ii) an “available reproduction time,” which is defined in the claims themselves as “a time available for reproducing the content based on the content data stored in the storage device of the reception device” (herein “available time”). *See* EX1001, Claims 1, 11, 16, 21, 22, 26, 27, 28, and 29.

A POSITA would understand that the claims require these two variables to be values that need to be used as an input to the determination process. *See infra*, §V.A. Moreover, as a threshold matter, a POSITA would understand that in order for these two variables to be used as the basis of the determination of the code rate of subsequent content data that is to be transmitted by the server, they must be first be

determined (examined, acquired etc.), otherwise they could not provide a basis for the determination. *See infra*, §V.A. Accordingly, the Petition fails because (1) none of the identified elements of the cited references correspond to the available time or the remaining time; and (2) even if the identified elements of the references were determined, they do not serve as a basis for the determination of the code rate of content data that is to be transmitted by the server, as the claims require. *See infra*, §V.B-D.

In the Institution Decision, the Board preliminarily found that *Chou*'s “**target buffer duration**,” which provides sufficient time between a target arrival time of a frame and its playback time, represents a time available for reproducing the content based on the content data stored in the storage device ..., teaches the argued ‘available reproduction time.’” ID., 41 (emphasis added). PO respectfully submits that this finding misapprehends the requirements of the claims. Specifically, the Institution Decision states that the “available reproduction time” is not limited to a “current buffer duration” because “we find no requirement to examine the buffer duration recited by claim 1, only to determine the code rate based on available reproduction time.” ID, 41. However, the “**available** reproduction time” in the claims refers to the duration of content that can be played **based on the data stored at the time of (or prior to) the determining of the code rate** at the receiving device (*i.e.* based on what is in the buffer). EX1001 Cl.1 & 1:67-2:3; EX2015 (Reader Tr.)

53:7-20(“Q: So the **available time reflects what is stored in the reception device...**? A: **That is what the claim requires.**”). Thus, making use of the current buffer duration is an express requirement of the claims.

A POSITA would understand that merely determining a bit rate for subsequent frames that may impact the future amount of data in the buffer is not sufficient. EX2012, ¶¶69, 100¹. *Chou, Wang, and Nobuyoshi* fail to disclose an “available reproduction time” is used in the determination of the code rate of subsequent frames. *Id.*, §V.

Similarly, Claim 1 requires the code rate to be determined based on “a remaining time” that the claim itself defines as “**remaining time before reproduction start time** set as time at which the reception device starts reproduction of the content **from a present moment.**” The references also fail to disclose using the “remaining time before reproduction” to determine the code rate for subsequent frames. *Id.*

II. Dr. Reader’s Opinions Are Unreliable

The Board should disregard Dr. Reader’s declaration because, as shown during his deposition, his opinions therein cannot be trusted. Dr. Reader admitted to having applied the incorrect standard for obviousness under the law and, admitted

¹ PO’s original expert is no longer available, so Exhibit 2001 is hereby withdrawn. See Trial Practice Guide (Consolidated Nov. 19 version) p. 51.

to using hindsight reconstruction to justify his invalidity theory, and changed invalidity theories multiple times on cross-examination.

First, Dr. Reader admitted that he did not apply the standard of what a POSITA would have understood at the time of the invention, instead he considered the prior art and what **he as an expert** understands. EX2015, 39:17-40:13(“the art in combination **with my education and experience** discloses what is being claimed”).

Second, Dr. Reader admitted that he used the challenged claims as a “roadmap” to develop his invalidity ground, explaining that he “considered the claim as a whole...and used that as a roadmap to find limitations in the prior art.” EX2015, 76:4-9. Accordingly, Dr. Reader’s analysis is unreconcilably flawed. *See Ruiz v. A.B. Chance Co.*, 357 F.3d 1270, 1275 (Fed. Cir. 2004) (“using the invention as a roadmap to find its prior art components, would discount the value of combining various existing features or principles in a new way to achieve a new result—often the very definition of invention.”).

Third, Dr. Reader was unable to consistently explain which portion of *Chou* allegedly teaches the “available reproduction time.” After admitting that *Chou* does not disclose determining the “buffer duration,” Dr. Reader then came up with different theories about what disclosure from *Chou* could be mapped to the claimed “available reproduction time.” EX2015, 99:4-12. Dr. Reader then deviated from his declaration and stated that the “target buffer duration” of *Chou* corresponds to the

“available reproduction time” (*Id.*, 142:24-143:2) but backpedaled when he reviewed his analysis that he had opinion in his declaration that the “target buffer duration” corresponded to the “target available reproduction time” in Claim 2. *Id.*, 146:23-150:24. In sum, Dr. Reader came to the new conclusion that **three different** calculations based on variables of *Chou* **could** correspond to the “available reproduction time,” but was unable to say which one of them definitively corresponded to the “available reproduction time.” *Id.*, 153:23-154:15. Dr. Reader’s rationale was that “*Chou* achieves [Claim [1d]], with a subset of the **potentially** available time,” and thus any of the subsets of potentially available time meets the claim. *Id.*, 150:8-15:24. But this contradicts his own testimony that the “claim requires” the “available time [to] reflect what is stored in the buffer. *Id.*, 53:17-20.

These inconsistencies did not go unnoticed by Peloton’s counsel. After questioning, Peloton’s counsel **read the declaration back** to Dr. Reader and, via improper leading questions, Dr. Reader **re-adopted** his original positions from the declaration. *Id.*, 187:19-202:11. This inability to provide a simple mapping for obviousness (which allegedly does not require modifications to *Chou*) and his inconsistent and contradictory testimony on cross-examination confirms that Dr. Reader’s testimony is unreliable and should be given no weight.

III. The Cited References

Petitioner asserts obviousness (35 U.S.C. §103) as grounds for invalidity but, as explained below, none of the references disclose all the claimed limitations in the challenged claims, and the combination of prior art references cited in the Petition fails to show that the “features of [the challenged claims] were *known prior art elements*.” *K/S HIMPP v. Hear-Wear Technologies, LLC*, 751 F. 3d 1362, 1365-66 (Fed. Cir. 2014) (emphasis added).

A. ***Chou* teaches techniques for controlling the coding bit rate based on a linear quadratic control technique and leaky bucket model (Ground 1)**

Chou differs significantly from the approach recited in the Challenged Claims. EX2012, ¶69. For instance, *Chou* controls the bit rate of content to achieve an upper bound of time of arrival of bits into the client’s buffer, and grows the size of the client’s buffer over time. *Id.* (citing EX1004, ¶¶19-20). In contrast, the Challenged Claims do not depend on controlling an upper bound that is a limit imposed by the encoder side buffer to influence buffer size at the client. *Id.* Instead, the Challenged Claims adjust the code rate of content data to be transmitted based on: (1) the time remaining before playback will begin, and (2) the amount of time the data currently in the buffer would take to playback at a normal playback/reproduction rate (“available reproduction time”). *Id.* Because of these substantially different

approaches, nothing in *Chou* corresponds to either the claimed “remaining time” or “available reproduction time.”

In *Chou*’s system, the problem of determining code rates for subsequent frames is “formulated as a standard problem in linear quadratic optimal control” that incorporates a “leaky bucket model into the control loop.” *Id.*, ¶70 (citing EX1004, ¶19). *Chou* discloses that the “leaky bucket model” can be visualized by imagining a scenario where the encoder and the decoder run in real time over a network, which is best visualized in Figures 2 and 3. *Id.* (citing EX1004, ¶60).

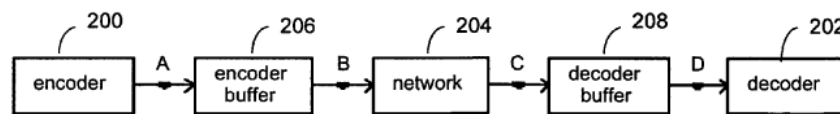


FIG. 2

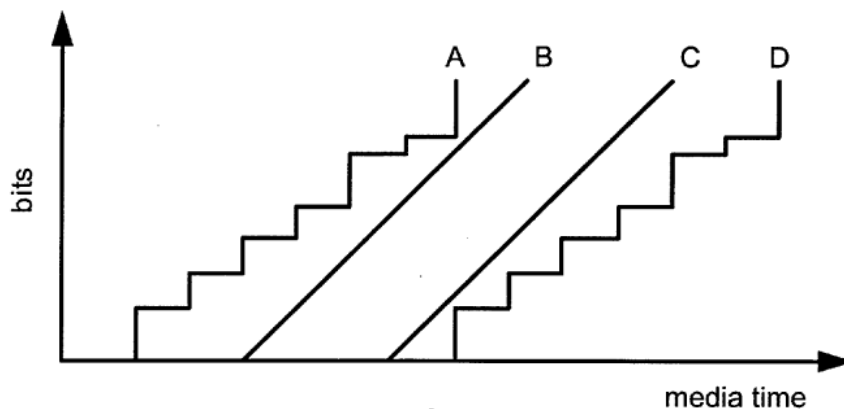
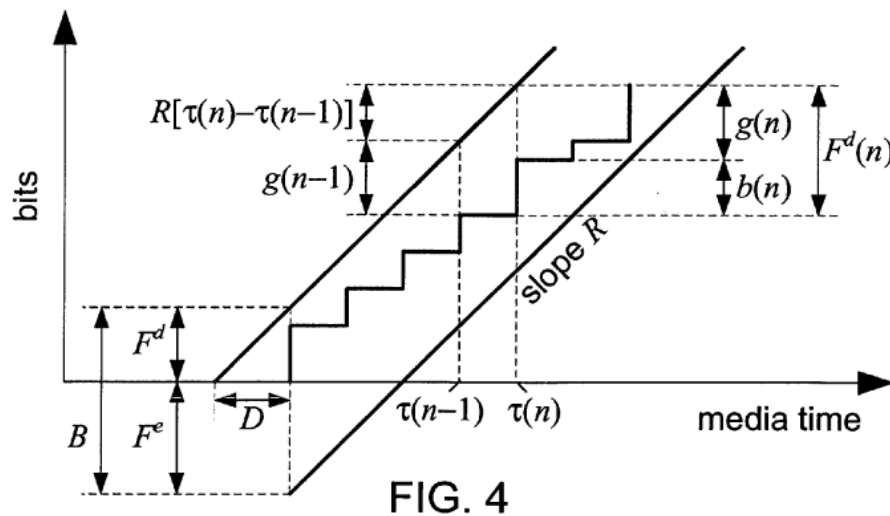


FIG. 3

EX1004, Figs. 2-3. Schedule A is the schedule at which captured frames are encoded and placed into the encoder buffer 206 with each “step” representing frame having the number of bits that correspond to that frame. *Id.* (citing EX1004, ¶60). Schedules B and C are the “schedules at which bits respectively enter and leave the

communication channel,” which is to say Schedule B represents when each bit leaves the encoder buffer 206 and Schedule C represents when each bit is received by the decoder buffer. *Id.* Schedule D is the “schedule at which frames are removed from decoder buffer” and decoded for presentation. *Id.* Importantly, *Chou* discloses that Schedule B is a “lower bound” to Schedule A, Schedule C is an “upper bound” to Schedule D. *Id.* Thus, since the system in *Chou* utilizes both an encoder buffer and a decoder buffer, Schedules B and C are disclosed to be the “buffer tube” that is said to bound both buffer schedules, which is shown in Figure 4. *Id.*



EX1004, Fig. 4.

Chou then extrapolates this model by dividing the y-axis, which was “bits” by “ r_a ” which is the rate “that bits arrive at the client,” to derive Figure 5. *Id.*, ¶71 (citing EX1004, ¶67).

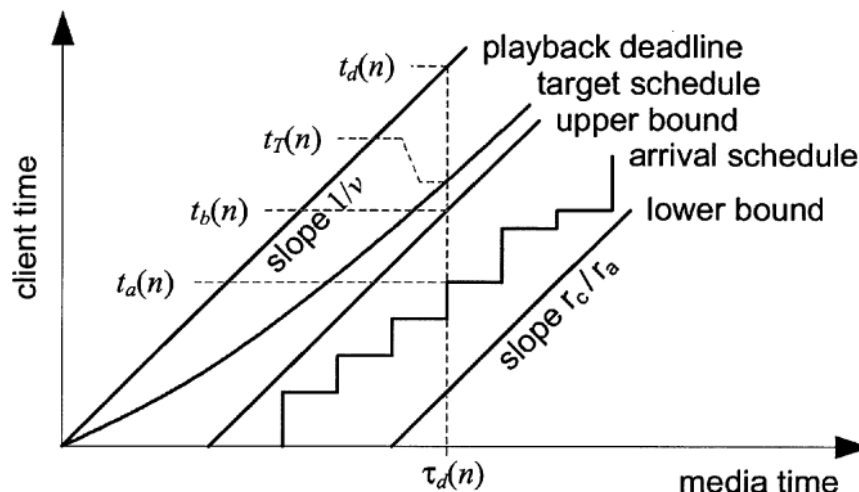


FIG. 5

EX1004, Fig. 5. Figure 5 also includes a “playback deadline,” which is the time “ $t_d(n)$ ” at which frame “ n ” is scheduled to be played, and a “target schedule” that is an idealized schedule of time “ $t_T(n)$ ” at which frame “ n ” would ideally arrive. *Id.* (citing EX1004, ¶67). Importantly, the idealized schedule of time “ $t_T(n)$ ” is *different* from the actual time “ $t_a(n)$ ” of arrival of frame “ n .” *Chou* discloses that “[b]y regulating the coding bit rate, it is attempted to control the buffer tube upper bound so that it tracks the target schedule.” *Id.* (citing EX1004, ¶70). *Chou* discloses that controlling the “buffer tube upper bound” is done via use of equation (18) to approximate “ $t_b(n)$ ” to “ $t_T(n)$ ” by solving for “the coding bit rate $r_c(n)$.” *Id.* (citing EX1004, ¶69).

$$t_b(n) = t_b(n-1) + \frac{r_c(n)}{f(n)\tilde{r}_a(n)} + w(n-1), \text{ where} \quad (18)$$

EX1004, ¶68.

This understanding gives meaning to *Chou*'s express statement of “[i]t is noted 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” because the actual arrival of bits is never actually determined or controlled. *Id.*, ¶72 (citing EX1004, ¶19). Indeed, *Chou* **warns** that “controlling the actual arrival times (rather than their upper bounds) to the target would result in an approximately constant number of bits per frame, which would in turn result in very poor quality overall.” *Id.* (citing EX1004, ¶70). Additionally, it is important to note that *Chou* warns that because of the nature of its system “at time $t_a(n)$, frame $n+2$ is the earliest frame for which the controller can determine the coding bit rate. Hence, at time $t_a(n)$, the controller’s job must be to choose $r_c(n+2)$.” *Id.* (citing EX1004, ¶81).

In essence, *Chou* discloses determining the bit rate based on an estimation between an “upper bound” that is defined by the constraints of the encoder buffer and an idealized “target schedule.” *Id.*, ¶73 (citing EX1004, Fig. 5, ¶67). A POSITA would understand this to mean that *Chou* is determining the code based on limitations of the encoder side buffer in a scheme that ensures the buffer does not drain or overflow, but the scheme does not include using “an available reproduction time” or “a remaining time” as an input. *Id.* Indeed, *Chou*'s warnings against controlling the actual buffer fullness and actual arrival time of frames would inform

a POSITA that utilizing the actual buffer fullness (or actual arrival time of frames) to determine the bit rate, which would in effect control the future value of the actual buffer fullness, would not be desirable for the reasons expressly provided in *Chou*. See *infra* §VI.B.4.

B. *Wang* teaches a modified RTCP packet for use in RTP protocols (Ground 2)

Wang is directed to embodiments deploying real-time transport protocol (RTP). EX1016, Abstract. *Wang* discloses a modification of RTCP packets that includes “receiver buffer information.” EX2012, ¶118 (citing EX1016, 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. EX1016, Abstract.

C. *Nobuyoshi* teaches techniques for terminals to join a playback session midway through a stream (Ground 3)

Nobuyoshi is a Japanese Patent that is discussed in the background of the ’101 Patent and cited on the face of the ’101 Patent. EX1001, Cover. *Nobuyoshi* addresses a situation where a user wishes to join a playback session midway through the program/stream. EX2012, ¶149 (citing EX1014, Abstract).

IV. Claim Construction

At this time, PO does not contend that any claim terms need construction and applies the ordinary and customary meaning. PO notes that Petitioner has taken

alternative claim construction positions in the related District Court litigation. Petitioner's arguments fail under the claim construction here and would most certainly fail under the proposed constructions in the related case. EX2014 (JCCB), 2-8, 14-15; EX2013 (Almeroth Dec. ISO Peloton CC), 29-30, 39-40 (contending that the term "remaining time" requires the value set as time to be from the first moment that the "artistic work as a whole" begins reproduction "after a session participation request" has been sent).

Moreover, PO acknowledges that the Board has determined that Claims 1-26 do not invoke means-plus-function interpretations, and Claims 27-29, which recite "means for," would have the structure and function identified in the Petition. ID., 12-18, 28, and 38.

V. Level of Ordinary Skill in the Art

For the purposes of this PO Response only, PO applies Petitioner's definition of POSITA. Pet., 14; EX2012, ¶¶29-34. Even applying that definition, however, the Petition should fail.

VI. Petitioner fails to show that limitation 1[d] was obvious

A. The claims require the available time and remaining time to be values that are used as the basis for the determination of the code rate.

The Institution Decision states that "we find no requirement to examine buffer duration recited by claim 1, only to determine the code rate based on available reproduction time." ID, 41. PO respectfully submits that this conclusion is based on

an incomplete reading of the claims². For example, Claim 1 recites using determining the code rate based on *inter alia* the “available reproduction time,” which the claims expressly state is “a time available for reproducing the content **based on the content data stored in the storage device of the reception device.**” EX1004, Claim 1. Accordingly, a POSITA would understand the “available reproduction time” to be a value, in time, corresponding to the time it would take for the stored content to be played back/reproduced. EX2012, ¶¶56-58; EX2015, 53:1-20 (Dr. Reader confirming “the available time reflects what is stored in the reception device.”).

As a threshold matter, a POSITA would understand that if an available reproduction time is not examined, acquired or determined, then no determination could be made on the basis of the available reproduction time. EX2012, ¶57. And a POSITA reading the ’101 Patent and Claim 1 would understand that this requires that the available reproduction time be used in the process of determining the code rate, which necessitates that the available reproduction time must first be determined by looking to the content data within the storage device of the reception device. *Id.* (citing EX1001, 9:60-10:18; 10:65-11:3). This is consistent with PO’s position in

² Although the discussion herein is with respect to independent Claim 1, independent Claims 11, 16, 21, 26, 27, 28, and 29 recite substantially similar elements as Claim 1 and therefore the analysis applies to each of the challenged independent claims.

the District Court litigation and consistent with PO's expert's opinion in the related District Court litigation. EX2014, 39-40 (explaining the claim requires the "two inputs [to be] considered (remaining time and available reproduction time)" when determining the code rate for subsequent content data to be transmitted by the server).

Claim 3 further confirms that the "available reproduction time" is a value of time. EX2012, ¶58. Claim 3 states, in part, "*multiplying* the acquired communication speed and the remaining time by a value of a result of subtracting *the available reproduction time* from the target available reproduction time," which demonstrates that the available reproduction time is a value representative of the actual time available for reproduction and is used as an input into the determination of the code rate. EX1001, Claim 3. As another example, Claim 2 describes the comparison of the "available reproduction time" by describing that the system "determine[s] a value becoming smaller as the available reproduction time becomes shorter than a target available reproduction time ... as the code rate." EX1001, Claim 2. A POSITA reading this would understand that the "available reproduction time" is an actual value of time available reproduction time that may "become shorter" than its "target" time. EX2012, ¶58.

Similarly, Claim 1 requires the code rate to be determined based on "a remaining time" that the claim itself defines as "*a remaining time before*

reproduction start time set as time at which the reception device starts reproduction of the content from ***a present moment.***” EX2012, ¶59. A POSITA would understand this to be a value used as an input to the determining the code rate step for the same reasons as for the “available reproduction time.” *Id.* The cited references in the Petition do not disclose such elements are used to determine the code rate for subsequent frames (e.g., the alleged “content data”). *Id.*

Accordingly, a POSITA would understand that Claim 1 requires the available reproduction time that was first determined, acquired, or “examined” using the content data stored in the storage device of the reception device and be used as an input when determining the code rate. *Id.*, ¶60 (citing EX1001, 9:60-10:18, 10:65-11:3, Claim 1).

1. The ’101 Patent Confirms That “Based On” Means that a Value of “the available reproduction time” and “remaining time” are used in the Determination.

The transmission device of the ’101 Patent is configured to transmit content coded one of a plurality of different code rates. EX2012, ¶61 (citing EX1001, Abstract, 5:12-20, 8:46-52). The ’101 Patent discusses determining the code rate “based on” the “available reproduction time” and the “remaining time” as actual values that are determined and used when “determine the code rate.” EX2012, ¶62. For example, it describes an “available reproduction ti[m]e transmission part...[that] acquires an available reproduction time, which is a time that the content reproduction

execution part 33c can reproduce the content based on the content data stored by the buffer part 33b, every time an acquisition period (a change period) set in advance elapses.” EX1001, 9:60-65. The ’101 Patent further describes that after the value is received the system “determines a code rate for the terminal device having transmitted the available reproduction time information, based on a remaining time before the acquired (i.e., set) reproduction start time from the present moment and the available reproduction time included in the available reproduction time information.” *Id.*, 10:7-18.

The ’101 Patent itself explains that a result “based on” a value means the value is used as an “input.” EX2012, ¶63. Exemplary equation (5) shows determining “a code rate r_{n+1} ” by using the “remaining time” calculated as “ $t_s - t_n$,” which is the “reproduction start time” subtracted from “time at the present moment” and “ T_n ,” which “denotes the available reproduction time received this time (i.e., at the present moment).” EX1001, 10:33-59.

$$r_{n+1} = B_n \cdot (t_s - t_n) / (T_d - T_n) \quad (5)$$

Id., 10:54. The ’101 Patent explains that this is an example of what is meant by “based on.” The ’101 Patent goes on: “[t]hat is to say, the content transmitting part 45 changes the code rate of the content data to be transmitted to the terminal available reproduction time information, to the code rate determined **based on the available reproduction time information.**” *Id.*, 10:65-11:3.

Accordingly, the claimed term “based on” requires use of the values representing the “available reproduction time” and the “remaining time” when determining the code rate, which are both values of time. EX2012, ¶64.

B. Ground 1 – *Chou* fails to render obvious “determining the code rate ... based on the *available reproduction time*” for several reasons

A POSITA would understand that Claim 1 requires that a value of available time for reproduction (based on the content data already stored) be used as a basis (*i.e.*, an input) to the determination of the code rate for subsequent content data to be transmitted by the server. *Supra*, §V.A. *Chou* does not disclose this. EX2012, ¶65. The Board and Petitioner have seemingly come to different conclusions regarding what in *Chou* corresponds to “an available reproduction time,” both of which are addressed in the following paragraphs.

In the Institution Decision, the Board found that the “target buffer duration” of *Chou* “teaches the argued ‘available reproduction time.’” ID, 41 (citing Pet., 8). As a preliminary matter, this argument was never advanced in the Petition. *Cf.* Pet., 8, 38-40. The Petition only points to the “gap” between the “*arrival schedule*” and the “playback deadline” as allegedly corresponding to the “available reproduction time” of Claim 1, whereas the “target buffer duration” is taught to be the difference between the “*target schedule*” and the “playback deadline.” EX2012, ¶66 (citing EX1004, Fig. 6; ¶0067). Accordingly, PO respectfully submits that such a theory

should not be addressed in this Proceeding. *SAS Institute, Inc. v. Iancu*, 138 S. Ct. 1348, 1356 (2018), (“Nothing suggests the Director enjoys a license to depart from the petition...”); *In re Magnum Oil Tools Int'l, Ltd.*, 829 F.3d 1364, 1381 (Fed. Cir. 2016) (“[W]e find no support for the PTO's position that the Board is free to adopt arguments on behalf of petitioners that could have been, but were not, raised by the petitioner....”).

Even to the extent the Petition had advanced the theory that the “target buffer duration” of *Chou* satisfied the “available reproduction time” limitation, this argument fails, as explained below. *Infra*, §VI.B.1; EX2012, ¶67.

With respect to the theories presented in the Petition, Petitioner’s argument relies on the incorrect assumption (without supporting evidence) that *Chou* discloses an available time determined based on the content data ***stored in the storage device***. Pet., 39 (arguing that *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).”); EX2012, ¶68. Petitioner appears to advance two different theories: (i) that the “gap” between the “arrival schedule” and the “playback deadline” is the claimed available time (See Pet., 8) and (ii) that the “gap” between the “*arrival time*” (i.e., actual arrival time) of a frame and the “playback deadline” is the available time (See Pet., 39-40). EX2012, ¶68. But as explained below, and by Peloton’s expert, the first would be “impossible.” *Infra*,

§VI.A.2. Moreover, Petitioner’s latter arguments are flawed because, as a threshold matter, the Petition fails to point to any evidence that a value of the “gap” is “examined” (e.g., determined, monitored, or otherwise acquired), much less used in the determination of the code rate for subsequent frames. *Infra*, §§VI.A.2.a, VI.A.2.c. Moreover, as demonstrated below, the alleged “gap” does not correspond to the claimed available time. *Infra*, §VI.A.2.b. A POSITA would understand that *Chou*’s disclosed method does not suggest using an available time to determine the code rate. *Infra*, §VI.A.3. Indeed, a POSITA reading *Chou* would understand that *Chou* teaches away from utilizing the available time. *Infra*, §VI.A.4.

1. *Chou*’s “target buffer duration” does not render obvious “determining the code rate ... based on the available reproduction time”

As noted above, in the Institution Decision, the Board stated that “Petitioner has established that *Chou*’s target buffer duration ... teaches the argued ‘available reproduction time’ (ID, 41); but, this was not articulated in the Petition. *SAS Institute Inc.*, 138 S. Ct., 1356. Nonetheless, a POSITA would not understand the “target buffer duration” to teach a “determining the code rate ... based on an available reproduction time” because (a) the available reproduction time is not a “target” time (*infra*, §VI.B.1.a); (b) the “target buffer duration” is not based on what is stored in the storage device of the reception device (*infra*, §VI.B.1.b); and (c) even if a value

of the “target buffer duration” was calculated (it is not), the value is not used as an input to determine the code rate (*infra*, §VI.B.1.c). EX2012, ¶74.

As background, the “target buffer duration” (*i.e.*, “desired buffer duration”) of *Chou* is the difference between the “playback deadline” and the “target schedule.” EX2012, ¶75 (citing EX1004, Fig. 6; ¶74). Figures 5 and 6 of *Chou* are reproduced below for reference.

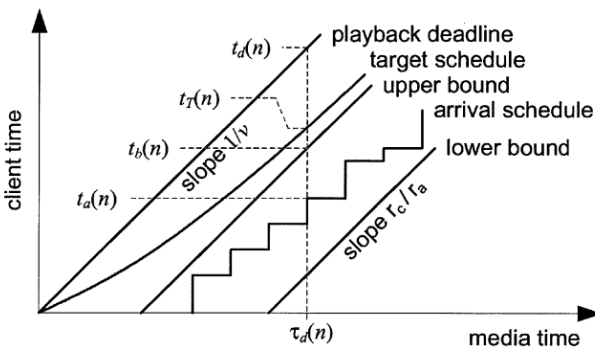


FIG. 5

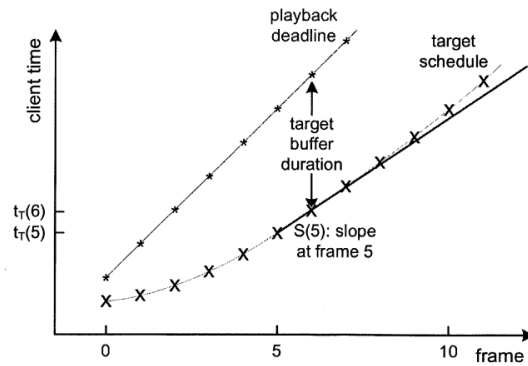


FIG. 6

EX1004; Figs 5 and 6. As shown in Fig. 5, *Chou*’s “target buffer duration” (*i.e.*, “desired buffer duration”) is what *Chou* describes as a “gap” between the “playback deadline” and its “target arrival.” EX1004, ¶74; Fig. 6. *Chou* describes this value in theoretical terms by explaining that “*if* the gap grows slowly over time, it gradually increases the receiver’s ability to counter jitter, delays, and throughput changes.” EX1004, ¶74. But *Chou* does not disclose, teach, or suggest that this theoretical relationship between the “playback deadline” and the “target schedule” is 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*,” as required by Claim 1. EX2012, ¶75.

Chou describes the “playback deadline” as “the time $t_d(n)$ at which frame n is scheduled to be played.” EX1004, ¶67. And a POSITA reading *Chou* would understand the “target schedule” to be an idealized “target” schedule that frames arrive. EX2012, ¶76 (citing EX1004, ¶27). Importantly, as seen in Figure 5, the “target schedule” is different from the “upper bound” and the “arrival schedule” of frames. *Id.* *Chou* teaches that its primary goal is to control the bit rate to approximate the “upper bound” to the “target schedule.” *Id.* (citing EX1004, ¶70).

a. Chou’s “target buffer duration” is a target time, but the “available reproduction time” is not

The claimed “available reproduction time” is not a “target value” and thus the “target buffer duration” of *Chou* is not an “available reproduction time.” EX2012, ¶77. A POSITA would understand the “available reproduction time” is a value representative of a “time available for reproducing the content” and that the value is “based on the content data *stored* in the storage device of the reception device” at the time of (or prior to) the determining of the code rate, as recited by Claim 1. *Id.* In view of the claim language, a POSITA would not understand “the available reproduction time” to be a “target value.” *Id.*

The dependent claims confirm this. EX2012, ¶78. They recite “a **target** available reproduction time” defined as “a **target value** of the available reproduction

time” and further explain various relationships of the “target available reproduction time” time to the “available reproduction time.” EX1001, Claims 2-3, 6, 9-10, 12-13, 18-19, and 23. For example, Claim 2 states the system “determine[s] a value becoming smaller as *the* available reproduction time becomes shorter than *a target* available reproduction time ... as the code rate,” which would not make sense if the “available reproduction time” was a “*target* available reproduction time.” EX2012, ¶78 (citing EX1001, Claim 2).

Accordingly, a “target buffer duration” is not the claimed available time. *Id.*, ¶79.

b. Chou’s “target buffer duration” is not “based on content data stored in the storage device” as required by Claim [1d]

The “target buffer duration” is not an available time because the target buffer duration is not “based on content data stored in the storage device of the reception device” as required by Claim 1. EX2012, ¶80. *Chou* describes the “target buffer duration” depicted in Fig. 6 as “the desired client buffer duration.” EX1004, ¶74. A POSITA reading *Chou* would understand this to mean that the “target buffer duration” is *not tied to any data that is already stored* in the reception device. EX2012, ¶80. Accordingly, a POSITA would understand that the “target buffer duration” specifies the *desired* amount of content data to be stored in the storage device at some future times, and *not* a value based on the content data already *stored*

in the storage device. *Id.* None of the Petition, Institution Decision, or *Chou* provide any rationale to the contrary.

Accordingly, even if *Chou*'s "determination of the code rate" were directly or indirectly based on the "target buffer time," *Chou* does not disclose this claim element because the "target buffer time" is not the claimed "available reproduction time." EX2012, ¶81.

c. Chou's "target buffer duration" is never used to "determine the code rate"

Claim 1 requires the "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." EX1001, Claim 1. A POSITA would understand this to mean that a value of the available time is used as an input into the determination of the code rate. *Supra* §VI.A. Thus, if the "target buffer duration" is alleged to be the available time (it is not for the stated reasons above), then for *Chou* to disclose this claim limitation, *Chou* must disclose that a value of the "target buffer duration" is used to determine the code rate of the "content data to be transmitted." EX2012, ¶82 (citing EX1001, Claim 1). It does not. *Id.*

As explained above, *Chou*'s control algorithm regulates the bit rate in "attempt[] to control the buffer tube upper bound so that it tracks the target schedule." EX2012, ¶83 (citing EX1004, ¶70). *Chou* determines a code rate by

approximating the “upper bound” to the “target schedule” for a future frame by utilizing equation (18). *Id.* (citing EX1004, ¶70). But nowhere in equation (18) is a “target buffer duration” used. *Id.*

A POSITA would understand that *Chou* does not disclose this limitation because the “target buffer duration” value (*i.e.*, a time) is never calculated and used in the determination of the code rate for subsequent frames. EX2012, ¶84. To the extent it is argued that approximating the “upper bound” to the “target schedule” means that the “target buffer duration” is indirectly used to determine the code rate, that point is moot because a POSITA would understand that the “target schedule” is not based on the “content data stored in the storage device of the reception device” as required by Claim 1. EX2012, ¶84. For example, *Chou* describes that the “target schedule” can be set one of two ways: (1) “by setting the target arrival time for each frame using a logarithmic target schedule”; or (2) “by setting the target arrival time for each frame using a two-piece linear target schedule where the difference between the target arrival time and the playback time [to a desired amount].” EX1004, ¶27. A POSITA would understand that these descriptions do not suggest the “target schedule” is based on the decoder buffer fullness. Instead, the “target schedule” is set based on the “playback deadlines” of frames to be played during playback of the content (*i.e.*, a movie), which a POSITA would understand is independent of what is stored in the buffer. EX2012, ¶84. *Chou*’s system then adjusts the code rate of the

data to control the slope of the “upper bound” so that the “upper bound” converges on the “target schedule, which a POSITA would understand to be independent of what is stored in the buffer. A POSITA would understand that the “target schedule” is an idealized time of when frames *should arrive in the future* and the “upper bound” is an encoder-side buffer limitation that dictates the earliest time that frames *could arrive in the future. Id.* That is, even if the “upper bound” matches the “target schedule” it merely means that *frames will arrive in the future* no earlier than the target schedule, which is independent from what has *already been stored*. EX2012, ¶84.

Accordingly, *Chou* does not disclose, teach, or suggest this Claim 1[d]. EX2012, ¶85.

2. *Chou’s “gap between a frame’s arrival schedule and its playback deadline” does not render obvious “determining the code rate ... based on the available reproduction time”*

For clarity, the Petition alleges that the “gap between the *arrival schedule* and the playback deadline” corresponds to the claimed “available reproduction time.” EX2012, ¶86 (citing Pet., 8, 38-40). This is different from *Chou’s* “target buffer duration,” (*i.e.*, “gap” between the “*target schedule*” and the “playback deadline,” which is what was identified by the Institution Decision as the “available reproduction time.” *Id.*; EX1004, Fig. 5; ID, 41. Notably, the Petition asserts in conclusory fashion that because “*Chou* examines the current buffer duration” it

therefore determines the code rate based on the gap. Pet., 38. To the contrary, Peloton’s own expert admitted that “no one can calculate that [gap] **because it is a point in the future**—and this is no different than rolling the dice in Las Vegas.” EX2015 (Reader Tr.), 94:17-95:8.

In the Institution Decision, the Board stated that “Patent Owner’s arguments concerning examining buffer fullness and calculating a difference in playback and arrive times do not appear to be commensurate in scope with claim 1, which has no such requirements, much less a requirement to monitor the actual reproduction time of content data stored in the storage device of the reception device.” ID, 41. Yet, as explained above, PO respectfully submits that this is an incomplete reading of the claim. *Supra*, §VI.A; EX2012, ¶87.

PO respectfully submits that, in order for *Chou* to disclose this element, *Chou* must disclose that a value of time available for reproduction of the content that is determined on the basis of the content data **stored** in the storage device and further use that value in the determination process. EX2012, ¶88. Petitioner’s argued “gap” in FIG. 5 between the “arrival schedule” and “playback deadline” fails this test because, as Peloton’s own expert admits, it would be impossible to calculate this time value for frames that have not arrived – and even if it were possible, it is not based on what is already **stored** at the reception device, as Dr. Reader admits is required by the claims. EX2015, 94:17-95:8; 53:17-20.

To the extent Petitioner meant that the “gap” between a frames playback deadline and its **actual** arrival time is the claimed available time, that argument similarly fails because value of that “gap” is (a) never determined (*i.e.*, acquired, calculated, monitored, etc.) (*infra*, §VI.B.2.a); (b) even if a value of it were to be determined, the value would **not** be a “time available for reproduction of the content based on the content data **stored**” at the reception device (*infra*, §VI.B.2.b); and (c) *Chou* does not teach or suggest using such a value in determining the code rate, and instead warns against attempting to control the “actual arrival” of frames and “the actual buffer fullness” (*infra*, §VI.B.2.c). EX2012, ¶89.

a. A value of Chou’s “gap” between the “arrival time” and the “playback deadline” is never determined.

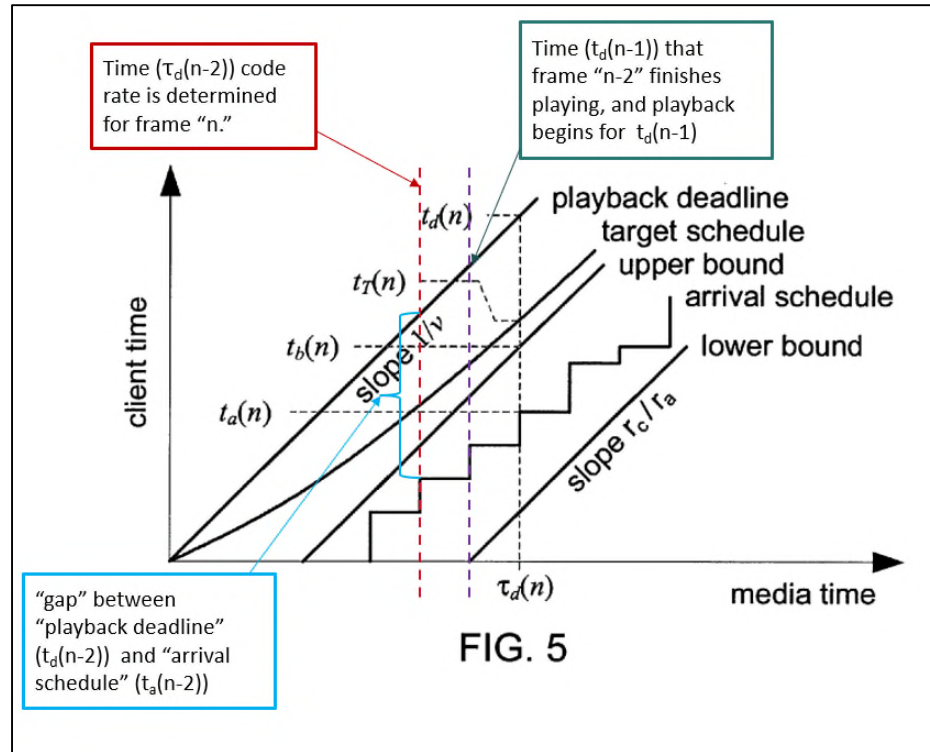
Chou does not disclose ever calculating the “gap” between the “arrival time” and the “playback deadline.” EX2012, ¶90. In *Chou*, the bit rate is calculated by estimating the “upper bound” of the arrival of bits to a “target schedule.” EX1004, ¶67. Importantly, the “upper bound” is not the “arrival time.” EX1004, Fig. 5. Moreover, *Chou* is clear “that controlling the actual arrival times (rather than their upper bounds) to the target ... would in turn result in very poor quality overall.” EX1004, ¶70.

Accordingly, a POSITA would understand it is undesirable to control the “actual arrival times” of frames and that *Chou*’s calculation of the bit rate should not be based on the actual “gap” between the “playback deadline” and the “arrival time.”

This would be contrary to *Chou*'s teachings that the system should ignore the actual arrival time of frames. EX2012, ¶91. In other words, a POSITA would conclude that a "gap" between the "playback deadline" and the "arrival time" should not be determined (or used in the calculation of the bit rate for subsequent frames) because *Chou* expressly discourages that approach: warning such attempts would "result in very poor quality overall." *Id.*

b. A value of Chou's "gap," is not the "time available for reproducing content based on the content data stored," as required by Claim [1d]

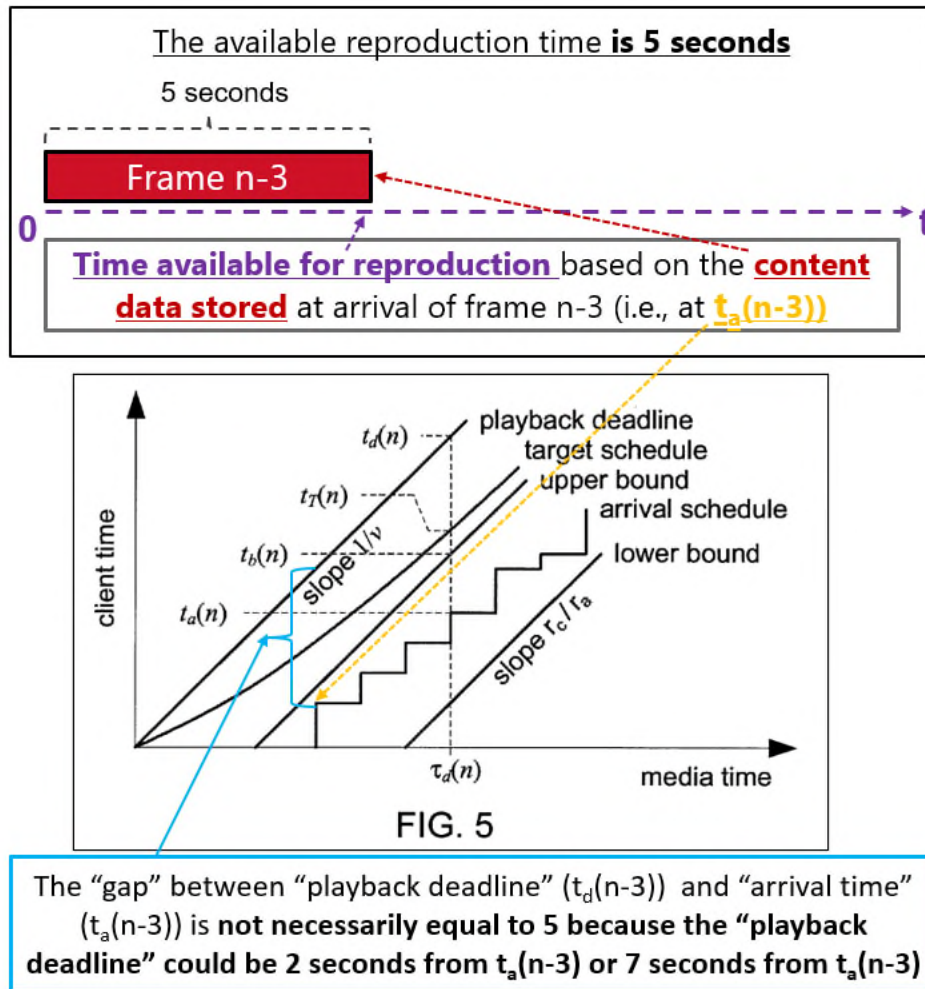
Even if a "gap between a frame's arrival time and its playback deadline" was calculated (it is not) it is still not the claimed "available reproduction time" "based on the content data stored in the storage device" because such a "gap" does not correspond to "a time available for reproducing the content based on the content data stored in the storage device of the reception device," as required by Claim 1. EX2012, ¶92. In particular, (i) a calculation of the gap yields a value that is different from a time available for reproducing the content and (ii) such calculation is not based on the content data stored. *Id.* These points are demonstrated below.



EX1004, Fig. 5 (annotated). As can be seen, a calculation of the “gap” between the “playback deadline” and the “arrival schedule” for frame “n-2” is depicted in blue. EX2012, ¶92. Time “ $t_a(n-2)$ ” corresponds to the time at which the code rate for frame “n” would need to be calculated, according to *Chou*. EX1004, ¶81 (“Indeed, at time $t_a(n)$, frame n+2 is the earliest frame for which the controller can determine the coding bit rate. Hence at time $t_a(n)$, the controller's job must be to choose $r_c(n+2)$. This one-frame delay in the feedback loop must be explicitly accounted for.”). But as can be seen from Figure 5, if the “gap” at time “ $t_a(n-2)$ ” was determined (it is not) for the code rate to be determined based on the value of that gap, it would not be the “available reproduction time.” EX2012, ¶92. For example, the “gap” at “ $t_a(n-2)$ ” in blue would yield a result of $t_d(n-2) - t_a(n-2)$, but the client device would not stop

playing until frame “n-2” *finished* playing at time “ $t_d(n-1)$.” *Id.* Thus, the “gap” between the “playback deadline” and the “arrival time” does not correspond to 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” as required by Claim 1. *Id.*

This example shows that the “gap” between the “playback deadline” and the “arrival time” are not the “available reproduction time” as defined by the claims, contrary to what the Petition suggests. EX2012, ¶93. For example, in the POPR, PO argued, in the alternative, that even if a value of the “gap” between the “arrival schedule” and the “playback deadline” were to be calculated then that value of the “gap” would not be the claimed available time because “it does not account for times where the buffer may not have any content data.” POPR, 22. PO’s point was that the “gap” is not necessarily tied to the actual content data **stored** in the storage device because (1) frames could have been dropped and thus not received, which would not be accounted for by referencing the “*arrival time*,” and (2) at various times, such as at startup, a value of the “gap” would not correspond to the actual frames that are **stored** in the storage device, as required by the claims, which is demonstrated here using the illustration below.



EX2012, ¶93.

In the Institution Decision, the Board stated: “[e]ven if correct, Patent Owner does not explain why this special case negates *Chou*’s ‘gap’ otherwise representing a time available for reproducing the content (e.g., during normal operations when the buffer does store content.)” ID., 43. But the examples given by PO demonstrate that the “gap” between the “playback deadline” and the “arrival time,” even if it were determined (it is not), does not *necessarily* correspond to a “time available for reproducing the content” because it is not “based on the content data **stored** in the

storage device,” as required by Claim 1. EX2012, ¶94. As such PO respectfully submits that these examples demonstrate that a value of the gap would be divorced from the actual time available for reproduction that is based on the content data stored, which means it does not teach the claimed available time. *Id.*

In other words, the Board’s hypothetical in the Institution Decision that implies that at times the value of the “gap” may correspond to the value of the claimed “available reproduction time” would **not** support a finding that the “gap” between the “playback time” and the “arrival schedule” inherently discloses the claimed available time. *Bettcher Indus., Inc. v. Bunzl USA, Inc.*, 661 F.3d 629, 639 (Fed. Cir. 2011) (“Inherency, however, may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient.”).

Thus, even if a value of the gap were calculated, it would not disclose this element. EX2012, ¶95.

c. A value of Chou’s “gap” between the “arrival time” and the “playback deadline” is never used to “determine the code rate”

Chou controls “an upper bound on the time of arrival of bits into the client buffer.” EX1004, ¶70. By use of equation (18), a controller can approximate the “upper bound” to the “target time” by adjusting the bit rate. EX1004, ¶69 (“Then using Eq. (18), the client can control the coding bit rate $r_c(n)$ so that $t_b(n)$ reaches a

desired value, assuming the frame rate and arrival rate remain roughly constant.”). But *Chou* does not teach that a value of the “gap” between the “playback deadline” and the “arrival schedule” should be determined, or that the determination of the code rate for subsequent frames should be determined based on the value of the “gap” at or before the time that the code rate is determined, which a POSITA would understand to be required for *Chou* to teach the claim element. *See supra* §VI.A; EX2012, ¶96.

To the contrary, a POSITA would understand that *Chou* teaches **not** to utilize such a “gap” in calculating new code rates. EX2012, ¶97. *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.***” EX1004, ¶67. And *Chou* also discloses that is “***not*** the actual fullness of the buffer” that is controlled. EX1004, ¶19. A POSITA would understand that *Chou* is teaching that a value of the “gap,” which is the “client buffer duration ***at the time of the frame arrival***” should ***not*** be used to determine the code rate for subsequent frames because doing so implies attempting to control the actual fullness of the buffer on the basis of the actual arrival times of frames, which *Chou* warns would result in “very poor quality overall.” EX1004, ¶70; EX2012, ¶97. Thus, a POSITA would conclude *Chou* does not teach determining the code rate based on the “gap” between a frame’s “playback deadline” and the frames “arrival time.” EX2012, ¶97.

For at least these reasons, *Chou* does not disclose Element [1d]. EX2012, ¶98.

3. *Chou*'s disclosed method of controlling the upper bound does not suggest "determining the code rate ... based on an available reproduction time"

The ID stated that "PO fails to explain why *Chou*'s disclosed control of an upper bound on the arrival of bits, thereby controlling a frame's arrival time, fails to result in also controlling (albeit indirectly) buffer duration." ID, 42. PO respectfully submits that simply "controlling buffer duration" regardless of whether it is direct or indirect is not sufficient because, as explained above, the claim requires the "available reproduction time" to be a value of the time available for reproduction based on the content data that is stored in the storage device at (or near) the time of the determination and requires it to be used in determining the code rate. *See supra* §VI.A; EX2012, ¶99. Moreover, as explained *infra* §VI.B.4, *Chou* expressly warns that "controlling a frame's arrival time" as suggested by the Board would result in "very poor quality." EX2012, ¶99.

Chou does not suggest ever using an available time in its calculation of the new code rate, or that it would be desirable to do so. EX2012, ¶100. Instead, equation (18) of *Chou* teaches using an update equation to approximate an "upper bound" to an approximated "target schedule." EX1004, ¶69; *Id.* This does not consider nor the actual time available for reproduction based on what is stored in the storage device. EX2012, ¶100.

Moreover, as explained above, *Chou* discloses that the earliest frame that can have a new code rate at time “ $t(n)$ ” is time “ $t(n+2)$.” EX1004, ¶81. A POSITA would understand this to mean that at time “ $t(n)$ ” the determination of the code rate needs to use a time available for reproduction based on what is in the storage device of the reception device to determine the bit rate. EX2012, ¶100. Yet, *Chou* does not disclose this nor does the petition allege that *Chou* discloses this. *Id.*

Accordingly, a POSITA would understand that controlling a bound on the earliest arrival of subsequent frames to a target time does not teach or suggest Element [1d]. EX2012, ¶101.

4. *Chou* teaches away from using the “client buffer duration” as an input to determining the code rate

As noted above, *Chou* teaches away by stating it is “***not*** the actual fullness of the client buffer that is controlled” and that considering the actual fullness (i.e. actual arrival times of the packets) “would in turn result in very poor quality overall.” EX1004, ¶¶19, 70. These explicit disclosures and warnings would color the rest of a POSITA’s analysis of *Chou*. EX2012, ¶102. A POSITA would understand that controlling the actual fullness of the buffer would require controlling the actual arrival times of the frames, which *Chou* states should not be done. In other words, using the actual fullness buffer at the time of arrival of a frame “ n ,” would mean that the determination of the code rate for frame “ $n+2$ ” is being determined on the basis of the ***actual arrival time*** of the frames – which a POSITA would understand

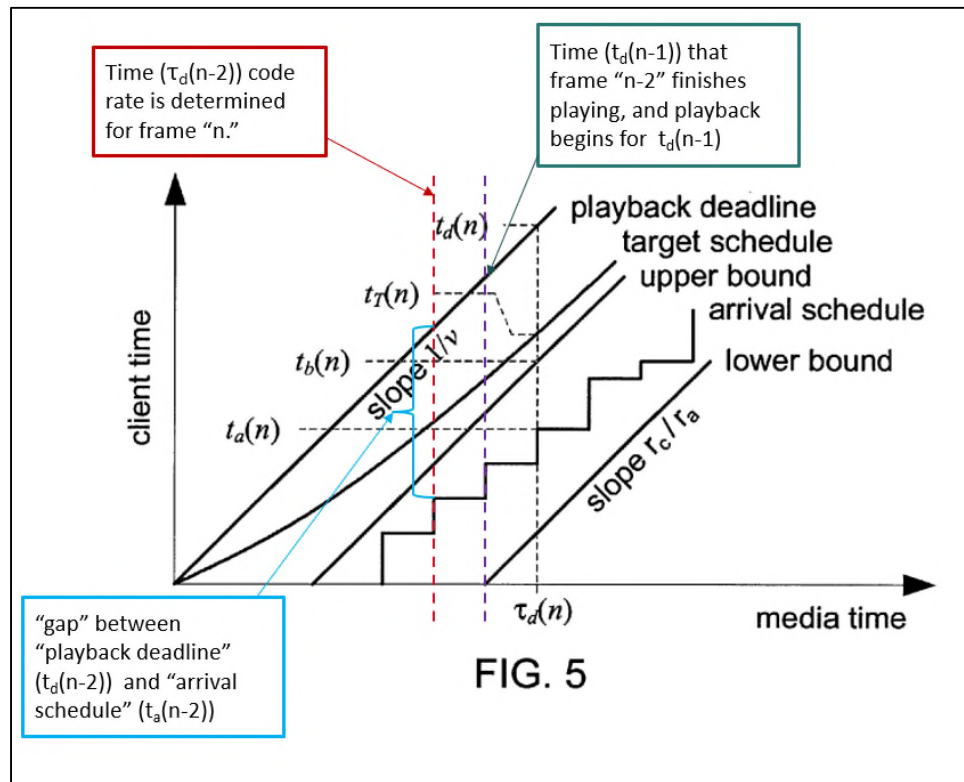
to be hazardous to the quality of playback in view of *Chou*'s warnings. *Id.* (citing EX1004, ¶67). Thus, a POSITA would not understand *Chou* to map to the claims, nor would it be obvious to modify *Chou* to do the very thing it cautions against. *Id.*

The ID notes "Patent Owner provides insufficient evidence that *Chou* teaches against also monitoring actual fullness of the client buffer." ID, 42. The merits of this are discussed above and in more detail below. *Infra* §§VI.B.a-c; EX2012, ¶¶103-104. But, as a threshold matter, PO respectfully notes that the *Chou* analysis in the ID relied on passages and arguments not alleged in the Petition and should not form a basis for unpatentability in this proceeding. *SAS Institute, Inc.*, 138 S. Ct., 1356; EX2012, ¶104.

- a. Even if the "current client buffer" was found to be used in the process of "determining the code rate" it is not "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" as required by Claim 1***

Chou's "current client buffer duration" is 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. EX2012, ¶105. *Chou* teaches 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." EX1004, ¶67. Thus, *Chou* discloses that the current client buffer duration at time " $t(n-2)$ " is the "difference between" the "arrival time" of frame " $n-2$ " and its "playback time," but this is not "a time available for

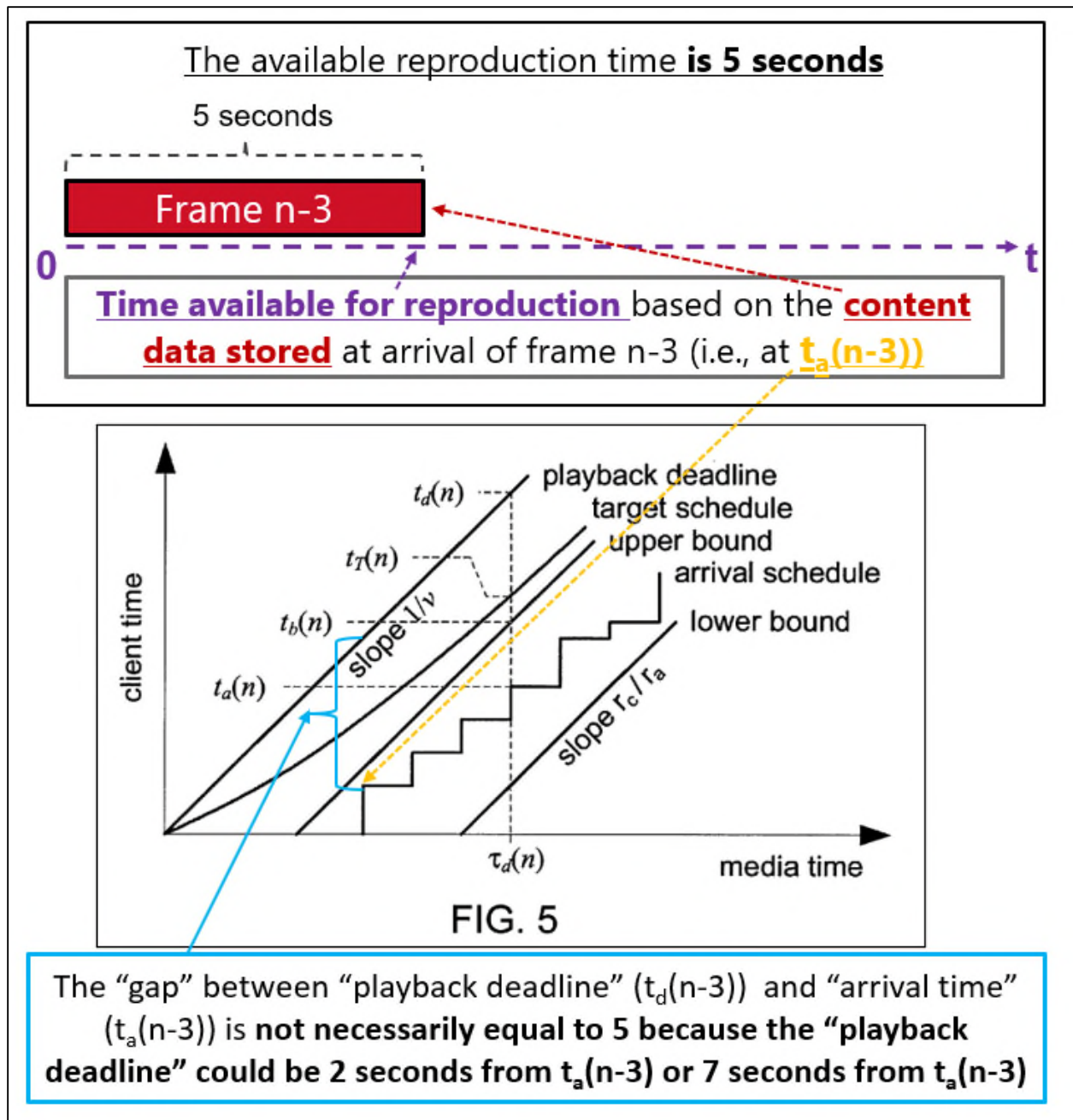
reproducing the content based on the content data stored in the storage device of the reception device.” EX2012, ¶105. This is demonstrated below with respect to annotated Figure 5 of *Chou*.



EX1004, Fig. 5 (annotated).

1. A POSITA reading *Chou* would understand at the time of arrival of frame $n-2$, the current client buffer duration is the “gap” between its arrival time and its playback deadline. EX2012, ¶106. But, as explained above, in §VI.B.2, the “gap” ($t_d(n-2) - t_a(n-2)$), which *Chou* discloses as the “client buffer duration at the time of the frame arrival,” is not “a time available for reproducing the content based on the content data stored in the storage device of the reception device” for two reasons. *Id.*

First, frame $n-2$ will not *finish* its playback until $t_d(n-1)$, thus the “time available for reproduction” is actually $(t_d(\mathbf{n-1})-t_a(n-2))$ and ***not*** *Chou*’s disclosure of $(t_d(\mathbf{n-2})-t_a(n-2))$. *Id.* Second, as explained above, the calculation is not based on the “content data ***stored*** in the storage device,” which a POSITA would understand because the simplistic estimated calculation does not look to the content data that is actually ***stored***. *Id.* For example, as demonstrated in the Figure below, the calculation is incorrect at the beginning of playback of the first frame where, at the arrival time of the first frame “ $n-3$ ” (with for example, 5 seconds of playback time), a value of the gap could be calculated to be larger than 5 seconds if its “playback deadline” was more than 5 seconds away from its arrival time or smaller than 5 seconds if its playback deadline was shorter than 5 seconds away from the time it arrived (which is very likely). *Id.* Moreover, this issue would be exacerbated each time there is any sort of trick play by a user (*i.e.*, pausing, seeking, etc.). *Id.*



Id.

Accordingly, a POSITA would understand that *Chou*’s “current client buffer duration” is not the claimed available time. *Id.*, ¶107.

***b. Chou’s fast startup technique does not disclose
“determining the code rate ... based on an available
reproduction time” as claimed***

The ID relied on *Chou*’s “fast startup technique” as evidence that “Chou does not teach away from monitoring, much less controlling, the actual fullness of the client buffer.” ID., 42. But *Chou*’s “fast startup technique” does not disclose “determining the code rate” based on the “available reproduction time.” EX2012, ¶108. *Chou* discloses that its “fast startup time” is a technique involving dividing the “arrival rate r_a ,” which is the speed of the transmission of bits of the network, by two to determine the bit rate r_c . *Id.*, ¶108 (citing EX1004, ¶90). In other words, *Chou* discloses that the network bandwidth (or speed of the transmission of bits in *the network connection*) alone should be used to determine the bit rate, without using the claimed “available reproduction time” that is actually stored in the client buffer. *Id.* *Chou*’s discussion that the buffer duration will grow does not in any way suggest that the actual buffer duration, at the time of determination of the code rate, is utilized. *Id.*

Moreover, a POSITA would understand that such a fast startup technique would result in an unnecessarily low bit rate (resulting in a low quality video displayed to the user), a problem that the ’101 Patent explicitly seeks to solve. EX1001; 4:15-18 (“the present invention enables a reception device to securely start reproduction of content at set reproduction start time while ***avoiding meaninglessly***

lowering a code rate.”). Accordingly, *Chou*’s “fast startup technique” does not disclose the claimed “determining the code rate ... based on an available reproduction time.” EX2012, ¶109.

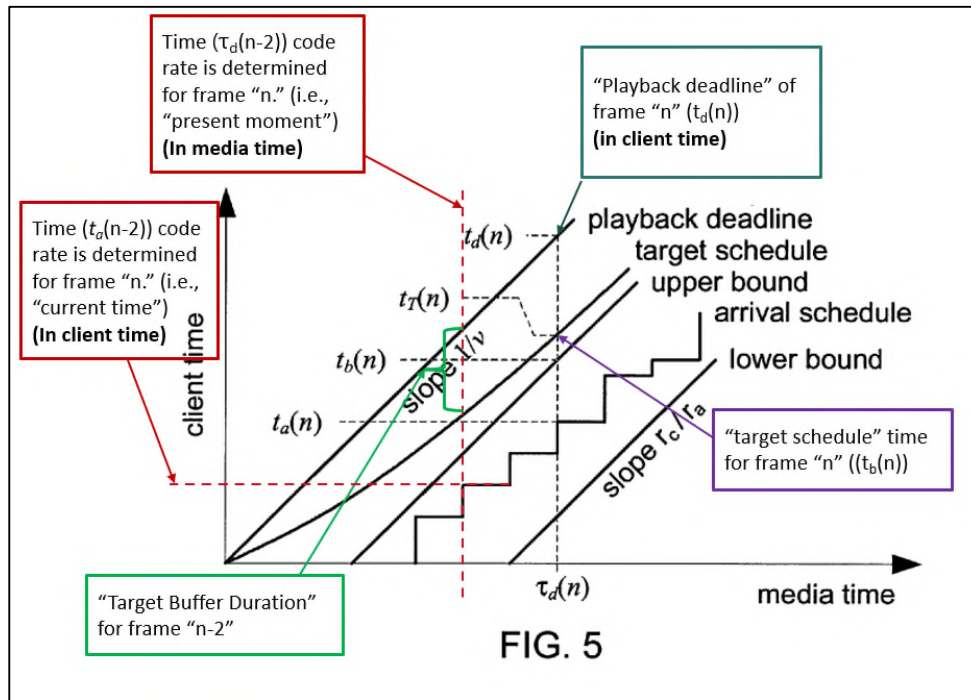
C. Ground 1 – *Chou* fails to render obvious “determining the code rate based on a *remaining time* before reproduction start time ...”

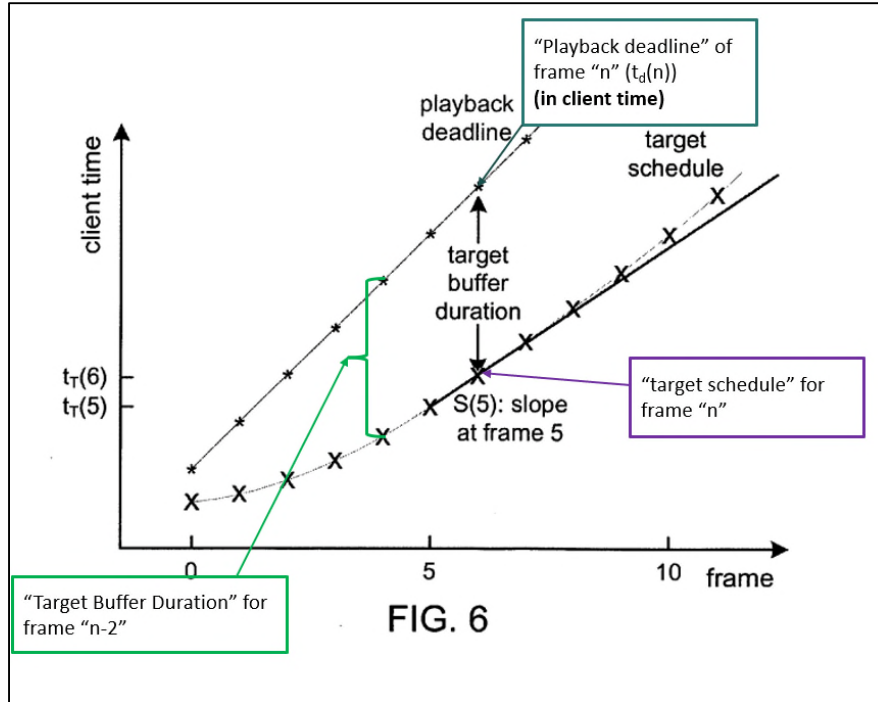
The Petition alleges that *Chou*’s disclosure of “target buffer duration” corresponds to the claimed “remaining time.” Pet., 35-36. The Petition concludes its argument on this term by stating “[a]ccordingly, at the moment *Chou*’s system is determining the new coding bit rate, it examines the desired target arrival time based on the target schedule for that frame (e.g., by looking at the slope) and adjusts the coding bit rate accordingly.” Pet., 38. But this analysis is flawed for the reasons described below. Petitioner’s argument is built on the unsupported assumption that *Chou*’s approximation of the “upper bound” to the “target schedule” to control the bit rate is somehow based on a remaining time that is set as time at which the reception device starts reproduction of the content from a present moment. EX2012, ¶110 (citing Pet., 35-36). But *Chou* does not disclose this, and *Chou*’s rate control is not based on the claimed “remaining time,” which is a measure of how long the reception device will take, from the present moment, to begin the playback of the frame to be transmitted at the new code rate. EX2012, ¶110.

1. *Chou's* “target buffer duration” is not a “remaining time”

The Petition incorrectly abstracts the process that *Chou* teaches to determine the bit rate for a subsequent frame. EX2012, ¶¶111-12 (citing Pet., 37). *Chou* does not base its determination of a bit rate on “remaining time before reproduction start time *set as time* at which the reception device is to start reproduction of the content *from a present moment*” as required by Claim 1.

As explained in §III.A, *Chou* teaches that its primary goal is to “control the buffer tube upper bound so that it tracks the target schedule.” EX2012, ¶113; EX1004, ¶70. Annotated Figures 5 and 6 are provided below for reference.





EX1004, Figs. 5 and 6 (Annotated). At time $\tau_d(n-2)$ (in media time), which corresponds to frame “n-2,” the earliest that the bit rate can be changed according to *Chou* is the bit rate for frame “n.” EX1004, ¶81 (“Indeed, at time $t_a(n)$, frame n+2 is the earliest frame for which the controller can determine the coding bit rate. Hence at time $t_a(n)$, the controller's job must be to choose $r_c(n+2)$.”). Accordingly, **in media time**, time $\tau_d(n-2)$ is the “present moment” (e.g., the present moment of when the bit rate is being determined for frame “n”) and the “reproduction start time” corresponds to the “playback deadline” (in media time) of frame “n,” $\tau_d(n)$. EX2012, ¶113. Moreover, **in client time**, time $t_a(n-2)$ is the “present moment” (e.g., the present moment of when the bit rate is being determined for frame “n”) and the

“reproduction start time” corresponds to the “playback deadline” (in client time) of frame “n,” $t_d(n)$. EX2012, ¶113.

In other words, a POSITA would understand that in order for the bit rate of *Chou* to be determined based on a “remaining time,” the bit rate would need to be determined based on the value of the “reproduction start time from a present moment” or $(\tau_d(n) - \tau_d(n-2))$ (in media time) or $(t_d(n) - t_a(n-2))$ (in client time). EX2012, ¶114. But *Chou* does not disclose, teach, or suggest that this, or anything analogous to it. *Id.* The Petition alleges that the “target buffer duration” is the “remaining time,” but as plainly seen in the annotated Figures, the “target buffer duration³” is not a “remaining time” that would be the “present moment” of $t_d(n-2)$ subtracted from the time at which frame “n” begins playback $t_d(n)$.) *Id.*

Indeed, a POSITA would not understand the “a remaining time before reproduction start time set as time at which the reception device starts reproduction of the content from a present moment” to be a “target” value. EX2012, ¶115. Rather, a POSITA would understand that the “remaining time” is a value before reproduction start time **set as time** at which the reception device starts reproduction of the content from a present moment, as required by Claim 1. *Id.*

³ Petitioner also alleges the “target buffer duration” is the “target available reproduction time” in Claim 2 and Petitioner’s expert alleges that it may be the claimed available time. Pet., 43-46; EX1006, ¶116; EX2015, 142:24-143:2.

Moreover, a POSITA would understand that a “playback deadline” is not sufficient to disclose this element because the “playback deadline” is merely a value expressed in client time or media time that alone is not “from a present moment,” as required by Claim 1. *Id.*, ¶116. For example, as shown, the “playback deadline” for frame “n” could be $\tau_d(n)$ in media time or $t_d(n)$ in client time, which would be two different values, neither of which is expressed relative to the present moment. Thus, contrary to the Petition’s statement that the “playback deadline for the subject frame [is] (the time reproduction will start from the present moment),” it is not because the “playback deadline” of *Chou* is not “from a present moment,” as demonstrated above and understood by a POSITA, instead a “playback deadline” merely a timestamp that is not measured “from a present moment.” *Id.*, ¶116; Pet., 36. For example, as demonstrated in the table below, a value of playback deadline is not equal to the “remaining time” without the reference frame of the “current time” (*i.e.*, a present moment).

Frame No.	Playback Deadline (Media Time)	Playback Deadline (Client Time)	Arrival Time (Media Time)	Arrival Time (Client Time)
N-3	0s	1:01:30 PM	-5s	1:01:25 PM
N-2	30s	1:02:00 PM	15s	1:01:45 PM
N-1	60s	1:02:30 PM	Unknown	Unknown
N	90s	1:03:00 PM	Unknown	Unknown
N+1	120s	1:03:30 PM	Unknown	Unknown

Frame **N-2** has arrived, the system is calculating the code rate for frame **N**. **Therefore, the “current time” (present moment for determining code rate of frame N) is the arrival time of frame N-2, which is 15s (media time) or 1:01:45 PM (client time).**

“Remaining Time” (for frame N) = 75s
(e.g., “90s – 15s” in media time; or 1:03:00PM – 1:01:45PM)
Thus, **playback deadline (90s) is not equal to remaining time (75s).**

“Available Reproduction Time” = 45s
(e.g., frame **N-2** will play for 30s in addition to the 15s left of playback for **N-2**)
Thus, “playback deadline” minus “arrival time” (30s – 15s = 15s) is **not equal to available reproduction time (45s).**

EX2012, ¶116.

As described above, *Chou* does not consider the “remaining time” because there is no value in equation (18) (or any of the equations) that suggest considering (i.e., basing the bit rate determination on) a “remaining time.” EX2012, ¶117. A POSITA would understand that *Chou*’s calculation of the code rate for subsequent frames is not based on the claimed remaining time. *Id.*

Accordingly, *Chou* fails to disclose determining a code rate based on a remaining time. *Id.*, ¶117.

D. Ground 2 – *Wang* does not cure the deficiencies of *Chou***1. *Wang* Overview**

Wang relates to real-time transport protocols (RTP). EX1016, Abstract; EX2012, ¶118. RTP is a protocol commonly used for streaming applications such as, for example, voice-over-IP (VoIP). EX2012, ¶118; EX2004; *see also* EX2005. RTP streams consist of media packets (*e.g.*, audio and video), each having a sequence number and a timestamp. EX2012, ¶118; EX2004, 4. RTP is used in conjunction with real-time transport control protocol (RTCP). EX2012, ¶118; EX2005, 40. *Wang* discloses a modification of RTCP packets to include “receiver buffer information.” EX1016, 4:64-67; EX2012, ¶119. This includes a 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. EX1016, Abstract; EX2012, ¶119. This information is used to calculate the current receiver buffer fullness level by calculating the time difference between the current time and the scheduled playout time of the selected packet. EX1016, 3:48-55; EX2012, ¶119. *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.” EX1016, 2:4-7; EX2012, ¶119. 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.” EX1016, 1:67-2:3; EX2012, ¶119.

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 EX1016, 7:13-18); EX2012, ¶120. The “transmission rate” is the number of packets that the sender sends per unit of time. EX2012, ¶120. The transmission rate therefore refers to the rate of packet transmission, not to changes to the encoding, allowing for distinct code rates as required by the Challenged Claims of the ’101 Patent. *Id.* The “nominal playout rate” is the rate the receiver reproduced the content per unit of time. *Id.* The nominal playout rate therefore is unrelated to the code rate of the data as required by the Challenged Claims. *Id.* Neither the transmission nor playback rates suggest determining or changing **a code rate** of the underlying data. *Id.*

2. The Petition’s arguments for motivations to combine fail because they are conclusory and change the principle of operation of the underlying references.

The Petition discusses the alleged motivation to combine *Chou* (directed to dynamic encoding) and *Wang* (directed to a streaming protocol) in §IX.D.1, but a POSITA would not be motivated to combine the two references because (1) a POSITA would understand that *Chou* teaches away from determining the code rate based on the available time (*supra* §VI.B.4) even if it was allegedly taught by *Wang*

(which it does not); and (2) Petitioner fails to show a reasonable expectation of success, as *Wang* and *Chou* are directed to different technologies, deployed at different network layers and operate independently to preserve efficiency and modularity in network system design. Pet., 68-75; EX2012, ¶122; EX2006, 313 (depicting encoding standards isolated from RTP in the network stack).

In general, the Petition discusses only abstractions of *Chou* and *Wang* to conclude that they both “manage buffer duration/fullness (based on time) in order to prevent buffer underflow[.]” EX2012, ¶123 (citing Pet., 69). The Petition then concludes *Chou* and *Wang* “both measure similar buffer characteristics to the ’101 Patent.[.]” *Id.* (citing Pet., 70). But the Petition provides no rational underpinning for these conclusions and does not discuss how these conclusions would provide motivation to a POSITA. *Id.* 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. *Id.* (citing Pet., 72-73). But the Petition does not explain what the proposed modifications would be, why, or how a POSITA could combine them. XX. Contrary to these unsupported conclusions, a POSITA would not and could not combine *Chou* and *Wang*. *Id.*

Notably, the Petition does not explain what element from *Wang* could or should be incorporated into *Chou*. *Id.*, ¶124. For example, it is unclear whether the

Petition is arguing that *Wang* could theoretically be combined with Chou to remedy *Chou*'s failure to disclose Claim Element [1d] in its entirety, 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; *Id.* As such, the Petition fails to articulate what combination it is proposing and is therefore deficient. EX2012, ¶124.

Moreover, the Petition improperly uses the '101 Patent as a roadmap to establish a motivation to combine. In particular, 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 why (or how) a POSITA would have been motivated to combine these references. EX2012, ¶123. To the contrary, because according to Petitioner both references allegedly disclose the same elements, a POSITA would not have been motivated to combine these references at all. *Id.* Accordingly, because the Petition does no more than simply point to various independent portions in *Wang* and *Chou* without explaining what is to be modified, why that modification would have been beneficial or motivated by anything other than hindsight, or how the combination would work, the Petition is deficient. *Metalcraft of Mayville, Inc. v. Toro Co.*, 848 F. 3d 1358, 1367 (Fed. Cir. 2017) (“Without any explanation as to how or why the references would be

combined to arrive at the claimed invention, we are left with only hindsight bias that *KSR* warns against.”).

a. Petitioner’s proposed combination of Chou and Wang together to meet limitation [1d] fails.

As the ID noted: “Petitioner does not clearly indicate that a POSITA would have had reason to combine Wang’s teaching of criteria used to maintain buffer fullness with *Chou*’s teaching of determining a code rate...”. ID, 54-55. Additionally, as noted by the Board, “Petitioner does not make any reference to *Chou* for teaching any aspect of limitation [1d] in connection [with] the combination of Ground 2.” ID, 54. Thus, to the extent that Petitioner alleges that *Wang* discloses only a portion of limitation [1d], the arguments should fail because the Petition fails to point out what elements Petitioner suggests should be combined and *how* and *why* a POSITA would combine them. EX2012, ¶125.

To the extent that Petitioner’s lone recitation that “a POSITA would have been motivated to use the buffer characteristic 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 Element [1d] after the word “determining” and is instead relying on *Wang* for these elements, a POSITA would not be motivated to combine *Chou* and *Wang* for two reasons. EX2012, ¶126 (citing Pet., 74-75).

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*. EX2012, ¶127 (citing EX1004, ¶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. *Id.* 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. *Id.* Neither the Petition nor Petitioner’s expert provide an explanation. *Id.* Indeed, modifying the algorithm of *Chou* in such a way could not be accomplished without undue experimentation. *Id.*

Second, by substituting the alleged elements from *Wang* into *Chou*, the entire purported novelty of *Chou* would be lost because *Chou* would no longer use its allegedly novel linear quadratic formula to control the code rate, and would instead, implement a technique that *Chou* explicitly teaches against. *Id.*, ¶128 (citing EX1004, ¶¶19, 70). Accordingly, a POSITA would not be motivated to change *Chou* to do the very thing it warns against: controlling the actual buffer fullness. *Id.* (citing EX1004, ¶¶19, 70).

Finally, such a combination would change the principle of operation of *Chou* and not be possible without significant effort and experimentation. *Id.*, ¶129.

Therefore, a POSITA would not be motivated to make the combination. *See In re Ratti*, 270 F.2d 810, 813 (C.C.P.A. 1959) (obviousness ground improper when it “would require a substantial reconstruction and redesign of the elements shown in [the prior art] as well as a change in the basic principles under which the [prior art] was designed to operate”).

b. A POSITA would lack motivation to combine Chou and Wang where Wang allegedly teaches the entirety of limitation [1d].

To the extent that Petitioner is arguing that *Wang* discloses the entirety of limitation [1d] (it does not as explained *infra*), a POSITA would still lack motivation to combine *Wang* and *Chou*. EX2012, ¶130.

First, such a combination would rest on a modification to *Chou* that would change the principle of operation of *Chou* in a manner that removes the purported novel algorithm. *Id.*, ¶131. In other words, such a proposed combination would necessitate that the entirety of *Chou*’s purported invention be removed to make way for *Wang*. *Id.* But a POSITA would not be motivated to do so, and the Petition fails to articulate *why* a POSITA would make this change. *Id.* To the contrary, *Wang* teaches that its purported invention is to control the buffer via the “transmission frequency at the sender of RTP packets.” *Id.* (citing EX1016, 5:4-8). While *Chou* warns that “controlling the actual arrival rates [of frames] ... would in turn result in a very poor quality overall.” *Id.* (citing EX1004, ¶70). A POSITA reading these

statements would understand that *Chou* warns against what *Wang* is suggesting. *Id.* In other words, a POSITA would not be motivated to combine *Chou* and *Wang* because *Wang*'s proposed solution ***touts that it is controlling the actual frequency that RTP packets are sent*** (and thereby controlling the actual arrival rates), which *Chou* expressly ***warns*** will “result in very poor quality overall.” *Id.* Indeed, even if *Wang* taught the entirety of limitation [1d] (it does not), to combine them, a POSITA would have to ignore the teachings of both *Chou* and *Wang*. *Id.*

Second, as explained above, *Wang* and *Chou* are directed to different technologies. *Id.*, ¶132. The Petition fails to reconcile the fact that *Wang* is not directed to an encoding scheme that would allow for a code rate to be selected and changed and the Petition fails to explain why a POSITA would ignore the teachings of *Chou* to substitute *Wang*. *Id.* 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. *Id.* 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. *Id.*

Accordingly, Petitioner fails to show that claim 1 of the '101 Patent is obvious over a combination of *Chou* and *Wang*. *Id.*, ¶133.

3. Wang fails to teach “determin[ing] the code rate based on a remaining time ... and based on an available reproduction time”

a. Wang fails to disclose “determining the code rate”

As a threshold matter, *Wang* does not disclose “a code rate.” The ID agreed ID., 53-54. But *Wang* also fails to disclose “determining” such a code rate. EX2012, ¶134.

The Petition alleges in conclusory fashion that *Wang* discloses a “code rate determining unit for determining the code rate.” EX2012, ¶135 (citing Pet., §IX.B.1). It does not. *Id.* The Petition points to *Wang*’s disclosures of adjusting the “transmission rate” or the “nominal playout rate.” Pet., 62-65; XX. But these are not “code rate[s]” as discussed above. *See Id.*; *supra* §VI.D.1. Neither the transmission nor playout rates suggest determining or changing a code rate of the underlying data carried by RTP packets. EX2012, ¶135.

Wang discloses that the invention is used in conjunction with an RTP media stream. *Id.*, ¶136 (citing EX1016, 2:50-53). Media coding is performed at higher-levels (i.e., an encoder operating at the application layer) and a POSITA would thus not have understood the “transmission rate” or the “nominal playout rate” to have any connection to the code rate of the underlying media content. *Id.* The Petition cites to a portion of *Wang* 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.” *Id.* (citing Pet., 63 (quoting EX1016, 6:31-35)). Yet, 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. *Id.*

Petitioner relies on its expert to fill this gap. EX2012, ¶137; Pet., 63 (citing EX1006, ¶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.” EX2012, ¶137 (citing EX1006, ¶253). This conclusory statement is unsupported. *Id.* Petitioner’s attempt to extrapolate the teachings of *Wang* are unfounded and not applicable to the general transmission rate that *Wang* discusses. *Id.* *Wang* itself discloses that the variable T_{last} 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. *Id.*; EX1016, 7:50-55. *Wang* never suggests that a code rate of the media content can be changed, much less determined. EX2012,

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

b. Wang fails to disclose “determining the code rate ... based on an available reproduction time”

The Petition maps *Wang*’s disclosure of the variable “ T_{last} ,” 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.” *Id.*, ¶138 (citing Pet., 63 (internal citations omitted)). However, 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.” *Id.* 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.” *Id.* In other words, since RTP, and the underlying UDP network transport protocol that it typically employs, does not offer any guarantees on packet arrival or in-order arrival, some may be lost, or some may arrive in a different order than the order they are supposed to be played back. As a result, if the buffer has received a packet that is the last packet to be played before earlier frames arrive and the system calculates the time difference from the present

moment to the playout time of that packet, there will be no content that is reproduced until that packet is scheduled to start to play. *Id.*

The ID stated that “Patent Owner does not explain why, in other cases wherein, for example, the packets do arrive in order, ‘T_{last}’ does teach an available reproduction time or why a POSITA would not have made appropriate adjustments to account for such cases.” ID, 55. PO contends that in some circumstances the value of “T_{last}” *may* correspond to a value of “a time available for reproducing the content based on the content data stored in the storage device of the reception device,” but it does not *necessarily* correspond to the same value as evidenced by the examples above. EX2012, ¶139. In other words, the value of “T_{last}” is not inherently the claimed available time because the situations in which this is the case rely on assumptions of loss-free, in-order packet delivery, which is rare in practice. *Id.* To the contrary, a POSITA would not have the common knowledge to correct for these errors. *Id.* For example, a POSITA would not know how to determine, in real-time, at the sender which packets were being delivered out of order because the RTCP protocol does not provide information regarding out-of-order deliveries. *Id.* Accordingly, a POSITA would need to modify the protocols to remedy this issue, which would not be a simple task. *Id.* Importantly, the Petition fails to allege a POSITA would be motivated to modify the protocols in such a way. *Id.*

Moreover, as explained in greater detail below, the Petition itself demonstrates why T_{last} is not the “available reproduction time.” See *infra*, §IV.B.4; EX2012, ¶¶140, 144-45. For 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. EX2012, ¶141.

Accordingly, *Wang* does not disclose Element 1[d]. *Id.*

4. *Wang* does not teach “determining the code rate based on a remaining time before reproduction start time... and based on an available reproduction time” (claim element [1d])

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.” EX2012, ¶142. Petitioner identifies *Wang* generally as disclosing this element. *Id.*; Pet., §IX.B.1. *Wang* does not disclose such element.

First, the Petition is deficient in its support and reasoning. EX2012, ¶143. The Petition maps *Wang*’s disclosure of the variable “ T_x ,” which is the “time difference between the current time and the scheduled playout time” of packet “x” to the “remaining time” of Claim 1. *Id.* (citing Pet., 62-63). But “ T_x ” is only used to determine “ T_{last} .” *Id.* Moreover, the Petition also maps that same variable “ T_{last} ,” when packet “x” corresponds to the last packet in the buffer, to the “available reproduction time.” *Id.* (citing 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.’” *Id.* (citing Pet., 62 (quoting EX1016, 7:13-20)). But the Petition fails to reason how or why “ T_x ” is the “remaining time before reproduction start time ... from a present moment” for a particular packet that the code rate is allegedly being determined for. Additionally, variable “ T_{last} ” is not “an available reproduction time” for the reasons stated above and thus *Wang* cannot disclose that anything is determined based on “an available reproduction time.” *See supra*, §IV.B.3; EX2012, ¶143.

The Petition also presents a different theory via a hypothetical situation created by Petitioner. EX2012, ¶144 (citing 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. *Id.* The entire theory is conjecture made up by Petitioner and its expert. *Id.* Even if it draws support for some of its assumptions from the specification, the surrounding assumptions make the entire hypothetical scenario nonsensical. *Id.* For example, Petitioner argues that “‘ T_{first} ’, 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. *Id.* (citing 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 “ T_{first} ” could be calculated if the beginning of the playback for the first packet depends on having already received eight packets – an assumption that could never be relied upon in the real world. *Id.* “ T_{first} ” could not possibly be calculated in this scenario because “ T_{first} ” corresponds to playout time (*e.g.*, beginning of playback) of the first packet when that playout time is *unknown* until eight packets have been received at the buffer. *Id.*

Nonetheless, accepting the assumptions presented by the hypothetical, the *Wang* reference itself contradicts the conclusions made in the Petition and demonstrates why T_{last} is **not** the claimed “available reproduction time.” *Id.*, ¶145. For example, the Petition states that “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)[,]” but this is not true. *Id.* (citing Pet., 64-65). *Wang* discloses that T_{last} would be equal to the playout time of the last packet from the current time. *Id.* (citing 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 Petitioner asks us to assume) begins three seconds from now, and there are five packets in the buffer (which Petitioner asks us to assume), the time calculated for playout of the last packet (*i.e.*, packet number five) would be **seven** seconds (*i.e.*, time stamp of packet five minus timestamp of packet 1 is four seconds plus three seconds before buffer playout begins) and **not five** seconds as the

Petition alleges. *Id.* (citing Pet., 64-65). This example, in addition to the ones in §VI.D.3, demonstrate that “ T_{last} ” would produce a value that is not representative of the time available for reproducing the content as the claims require. *Id.*

Accordingly, not only does the hypothetical example provided in the Petition not remedy *Wang*’s deficiencies described above, but it also demonstrates why *Wang* fails to disclose Element [1d]. *Id.*, ¶146.

E. Ground 3- *Nobuyoshi* does not cure the deficiencies of *Chou*.

Nobuyoshi was considered at the time the ’101 Patent was prosecuted. EX2012, ¶150. *Nobuyoshi* is relied on in combination with *Chou* as allegedly disclosing claims 5, 7, and 15. *Id.* (citing Pet., §IX.C). The Petition does not allege that *Nobuyoshi* remedies the deficiencies of *Chou* as they relate to Claim Element [1d] discussed above. *Id.* 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). *Id.*

F. Claims 11, 16, 21, 26, 27, 28, and 29 along with their respective dependent claims are not obvious in view of the cited art

Although the discussion herein is with respect to independent Claim 1, independent Claims 11, 16, 21, 26, 27, 28, and 29 recite substantially similar elements as Claim 1 and therefore the analysis applies to each of the challenged independent Claims. EX2012, ¶¶153-154. Moreover, Claims 2, 4, 5, 7, 12, 14, 15, 17, 18, 20, 23, and 25 depend, directly or indirectly, from a respective independent

Claim 1, 11, 16, or 21 and therefore the Petition fails to render these claims obvious based at least on their dependency. *Id.*, ¶¶151, 153-154.

VII. Conclusion

For the reasons set forth herein, all of Petitioner's grounds fail to show that any of the Challenged Claims are unpatentable.

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Respectfully submitted,

/ Eliot D. Williams /
Eliot D. Williams, Reg. No. 50,822
BAKER BOTTS L.L.P.
700 K Street NW
Washington, DC 20001
Tel: (202) 639-7700
eliot.williams@bakerbotts.com

Robert L. Maier, Reg. No. 54,291
Jennifer C. Tempesta, Reg. No. 59,021
Michael E. Knierim, Reg. 78,268
Nicholas Palmieri, Reg. 79,227
BAKER BOTTS L.L.P.
30 Rockefeller Plaza
New York, NY 10112-4498
Tel: (212) 408-2500
robert.maier@bakerbotts.com
jennifer.tempesta@bakerbotts.com
michael.knierim@bakerbotts.com
nicholas.palmieri@bakerbotts.com

CERTIFICATE OF COMPLIANCE

Pursuant to 37 C.F.R. § 42.24(d), the undersigned certifies that the foregoing Patent Owner's Response, exclusive of the exempted portions as provided in 37 C.F.R. § 42.24(a), contains 13,720 words and therefore complies with the type-volume limitations of 37 C.F.R. § 42.24(b).

Date: May 31, 2024

/ Eliot D. Williams /
Eliot D. Williams, Reg. No. 50,822
BAKER BOTTS L.L.P.
700 K Street NW
Washington, DC 20001
Tel: (202) 639-7700
eliot.williams@bakerbotts.com

Lead Counsel for Patent Owner

CERTIFICATE OF SERVICE

Pursuant to 37 C.F.R. §§ 42.6(e) and 42.105(a), this is to certify that I caused to be served a true and correct copy of the foregoing “PATENT OWNER’S RESPONSE” and Exhibits 2012-2015 thereto via the PTAB’s E2E system and sent via email as detailed below.

Date of service: May 31, 2024

Documents served: PATENT OWNER’S RESPONSE

Person(s) Served:

Scott Weidenfeller (sweidenfeller@cov.com)
Anupam Sharma (asharma@cov.com)
Darren Franklin (dfranklin@sheppardmullin.com)
Michael J. Hopkins (mhopkins@sheppardmullin.com)
Daniel Yannuzzi (dyannuzzi@sheppardmullin.com)

Date: May 31, 2024

/ Eliot D. Williams /
Eliot D. Williams, Reg. No. 50,822

Lead Counsel for Patent Owner