

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

PELOTON INTERACTIVE, INC.,
Petitioner

v.

NEC CORPORATION,
Patent Owner

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

**PETITION FOR *INTER PARTES* REVIEW
OF U.S. PATENT NO. 8,752,101**

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EXHIBIT LIST

Exhibit No.	Description
EX1001	U.S. Patent No. 8,752,101 B2 (“the ’101 patent”)
EX1002	File History of U.S. Patent No. 8,752,101 B2 (U.S. Application No. 13/508,025) (“’101 FH”)
EX1003	Lee, Chiang, and Zhang, <i>Scalable Rate Control For MPEG-4 Video</i> , IEEE Transactions on Circuits and Systems for Video Technology, Vol. 10, No. 6, pp. 878 – 894, September 2000
EX1004	U.S. Publication No. US 2006/0143678 A1 (“Chou”)
EX1005	File History of corresponding European Patent No. 2498492
EX1006 ¹	SEALED Dr. Clifford Reader Declaration (“Reader Declaration”)
EX1007	International Publication No. WO 2006/108435 (“Kampmann”)
EX1008	Japanese Unexamined Patent Application Publication No. 2005-191786
EX1009	Japanese Unexamined Patent Application Publication No. 2007-13705
EX1010	U.S. Patent No. 8,909,809 (the ’809 patent”)
EX1011	Japanese Unexamined Patent Application Publication No. 2004-172830
EX1012	Certified English Translation of Japanese Unexamined Patent Application Publication No. 2004-172830
EX1013	Certified English Translation of Japanese Unexamined Patent Application Publication No. 2005-191786
EX1014	Certified English Translation of Japanese Unexamined Patent Application Publication No. 2007-13705
EX1015	Kozamernik, <i>Webcasting - The Broadcasters’ Perspective</i> , EBU Technical Review, March 2000 (“Kozamernik”)
EX1016	U.S. Patent No. 5,867,230 (“Wang”)
EX1017	U.S. Patent No. US 6,637,031 B1 (“Chou ’031”)
EX1018	Cen, Pu, and Walpole, <i>Flow And Congestion Control for Internet Streaming Applications</i> , Multimedia Computing and Networking 1998
EX1019	Lu, <i>Signal Processing for Internet Video Streaming: A Review</i> , Proceedings of SPIE, Volume 3947, p. 246-259, January 2000 (“Lu”)

¹ A redacted, public version of the Reader Declaration is provided as EX1037.

Exhibit No.	Description
EX1020	Haskell, Puri, and Netravali, <i>Digital Video: An Introduction to MPEG-2</i> , chapter 8, pp. 156-182 (“Haskell”)
EX1021	ITU H.262 (07/95)
EX1022	Ebrahimi, <i>MPEG-4 natural video coding – An overview</i> , Signal Processing: Image Communication, V.15 Iss. 4-5, Jan. 2000, pp. 365-385 (“Ebrahimi”)
EX1023	ITU H.261 (03/93)
EX1024	ITU H.222.0 (07/95)
EX1025	Ruiu, <i>An Overview of MPEG-2</i> , The 1997 Digital Video Test Symposium
EX1026	Huang, Chou, Klemets, <i>Optimal Coding Rate Control for Scalable Streaming Media</i> (“Huang”)
EX1027	U.S. Publication No. US 2004/0128396 A1 (“Patrick”)
EX1028	U.S. Patent No. US 7,711,841 B2 (“Desphande”)
EX1029	van Beek and Demircin, <i>Delay-Constrained Rate Adaptation for Robust Video Transmission Over Home Networks</i> , IEEE International Conference, V.2, (“van Beek”)
EX1030	U.S. Patent No. 5,822,524 (“Chen”)
EX1031	SEALED NEC’s Infringement Contentions served in <i>NEC Corp. v. Peloton Interactive, Inc.</i> , No. 1:22-cv-00987-CFC (U.S. District Court, District of Delaware, filed July 28, 2022)
EX1032	Reader C., “Intraframe and Interframe Adaptive Transform Coding”, SPIE Vol. 66, 1975
EX1033	Reader C, "MPEG4: Coding for Content, Interactivity, and Universal Accessibility", Optical Engineering, Vol. 35, No. 1, pp. 104-108, Jan 1996
EX1034	“MPEG Video Compression Standard”, Edited by J. L. Mitchell et al, Chapter 16, “MPEG Patents”, pp.357-362
EX1035	Proposal and Consideration of Buffer Size, NTT, KDD, NEC, Fujitsu, CCITT SG IV Working Party XV/1 Specialist Group on coding for Visual Telephony, Document #287, January 1988
EX1036	Scheduling Order filed on March 20, 2023 in <i>NEC Corp. v. Peloton Interactive, Inc.</i> , No. 1:22-cv-00987-CFC (U.S. District Court, District of Delaware, filed July 28, 2022)
EX1037	REDACTED PUBLIC version of Reader Declaration

I. INTRODUCTION

The '101 patent is an obvious combination of prior art teachings. The Challenged Claims essentially recite: (i) transmitting content data to a reception device; (ii) storing the content data into a storage device and reproducing the content; (iii) determining the code rate based on a remaining time before reproduction start time and on an available reproduction time; (iv) changing the code rate to the determined code rate; and (v) reproducing the content at the reproduction start time. This functionality was well known before the '101 patent. EX1006, ¶¶28-58, 70-77.

II. MANDATORY NOTICES UNDER 37 C.F.R. § 42.8(a)(1)

As set forth below and pursuant to 37 C.F.R. § 42.8(a)(1), Petitioner provides the following mandatory notices as part of this petition.

A. Real Party In Interest Under 37 C.F.R. § 42.8(b)(1)

The real party-in-interest for Petitioner is Peloton Interactive, Inc. No other parties directed, controlled, or funded this *inter partes* review petition.

B. Related Matters Under 37 C.F.R. § 42.8(b)(2)

To Petitioner's best knowledge, the '101 Patent is presently the subject of the following patent infringement lawsuits brought by the assignee, NEC:

- *NEC Corp. v. Peloton Interactive, Inc.*, No. 1:22-cv-00987-CFC (U.S. District Court, District of Delaware, filed July 28, 2022) (hereinafter, the “**Related Litigation**”); and
- *NEC Corp. v. Our Body Electric Inc.*, No. 1:22-cv-00986-CFC (U.S. District Court, District of Delaware, filed July 28, 2022).
- *NEC Corp v. Tone It Up Inc.*, No. 1:22-cv-00988-CFC (U.S. District Court, District of Delaware, filed July 28, 2022).

To Petitioner’s best knowledge, the ’101 patent was not previously challenged in an IPR.

C. Lead and Back-Up Counsel Under 37 C.F.R. § 42.8(b)(3)

Pursuant to 37 C.F.R. § 42.8(b)(3), Petitioner provides the following designation of counsel:

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An appropriate power of attorney is filed concurrently herewith.

D. Service Information Under 37 C.F.R. § 42.8(b)(4)

Service on Petitioner may be made by mail or hand delivery to: Sheppard Mullin Richter & Hampton LLP, 12275 El Camino Real, Suite 100, San Diego, California 92130-4092. The telephone and facsimile numbers for lead and backup counsel are shown above. Petitioner also consents to electronic service by e-mail at dyannuzzi@sheppardmullin.com, dfranklin@sheppardmullin.com, and mhopkins@sheppardmullin.com.

III. PAYMENT OF FEES

Petitioner submits the fees required by 37 C.F.R. §§ 42.15(a) and 42.103(a). The undersigned further authorizes charging Deposit Account. No. 50-4561 for any additional fees that might be due in connection with this petition.

IV. REQUIREMENTS FOR *INTER PARTES* REVIEW

A. Grounds for Standing

Petitioner hereby certifies that the '101 Patent is available for IPR, that this petition is timely filed, and that Petitioner is not barred or estopped from requesting IPR on the grounds herein.

B. Identification of Challenge and Relief Requested

Petitioner requests IPR and cancellation of claims 1, 2, 4, 5, 7, 11, 12, 14-18, 20-23, 25-29 (the “Challenged Claims”) on these grounds:

Grounds	Claims	Statutory Basis	Prior Art
1	1, 2, 4, 5, 7, 11, 12, 14-18, 20-23, 25-29	§103	<i>Chou</i>
2		§103	<i>Chou</i> in view of <i>Wang</i>
3	5, 7, 15	§103	<i>Chou</i> in view of <i>Nobuyoshi</i>

The grounds above are confirmed and supported by the Reader Declaration (EX1006) and render the Challenged Claims obvious because any differences between the claimed subject matter and the prior art would have been obvious to a person of ordinary skill in the art (“POSITA”) at the time of invention. *See KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). EX1006, ¶¶59-69.

1. Claim Construction

Section VI discusses claim construction.

2. Unpatentability of the Construed Claims

Section IX explains how the Challenged Claims are unpatentable, including an identification of where each claim element is found in the prior art.

3. Supporting Evidence

The exhibit numbers of the supporting evidence relied upon are provided in the exhibit list and Section IX.

C. Prior Art²

1. *Chou*

Chou (filed December 10, 2004; published June 29, 2006) is prior art under pre-AIA 35 U.S.C. §102(a) and 102(b). EX1006, ¶85.

Chou relates to a system for controlling the coding bit rate of “streaming media data to control the client buffer duration.” EX1004, Abstract, ¶0019; EX1006, ¶86.

Chou, like the ’101 patent, teaches a distribution system (FIGs. 11A-C and accompanying description) that transmits content from a transmission device (server) to a reception device (client). EX1006, ¶87.

Chou’s “server generates data streams that exhibit one of a number of coding bit rates supported by the server, and transmits data streams at the most

² Pre-AIA 35 U.S.C. § 102 applies. MPEP §2159.01.

appropriate supported coding bit rate closest to the rate requested by the client.”

EX1004, ¶0031.

Chou teaches the client storing received content data into a decoder buffer and reproducing content from the stored data. EX1004, ¶0028.

Chou teaches determining the code rate based on a remaining time before reproduction start time (playback deadline), and an available reproduction time (“buffer duration”). EX1004, FIG. 5. EX1006, ¶90.

More specifically, *Chou* teaches an “available reproduction time” because the client has a buffer and “[t]he size of the client buffer can be expressed as the number of seconds of content in the buffer, called the buffer duration.” EX1004, ¶0007. As shown in FIG. 5, frames arrive at the client between the upper and lower bounds, in an “arrival schedule.” EX1004, ¶0067. *Chou* states “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, FIG. 5. Accordingly, in FIG. 5, the gap between the “arrival schedule” and “playback deadline” is the “buffer duration,” equivalent to the “available reproduction time.” EX1004, ¶0067.

Thus, *Chou* teaches the “reproduction start time,” shown by the “playback deadline” (FIG. 5). EX1004, ¶0067. EX1006, ¶92. *Chou* states the “playback deadline” is the time at which frame *n* is scheduled to be played. EX1004, ¶0067.

Chou achieves “uninterrupted playback” by “regulating the coding bit rate so that the client buffer does not underflow.” EX1004, ¶0070.

The “target schedule” (set at a shorter client time than the playback deadline) provides a “margin of safety.” EX1004, ¶0070. *Chou* states “[b]y regulating the coding bit rate, it is attempted to control the buffer tube upper bound [to track] the target schedule.” EX1004, ¶0070. *Chou* further states “[i]f the buffer tube upper bound is close to the target schedule, then the arrival times of all frames will certainly be earlier than their playback deadlines” resulting in uninterrupted playback. EX1004, ¶0070. Thus *Chou* regulates the coding bit rate to control the buffer tube upper bound so that it tracks the target schedule, which is relative to the playback deadline. EX1004, ¶0070. EX1006, ¶94. Accordingly, *Chou* teaches regulating the code rate (controlling the upper bound of the arrival schedule) based on a remaining time before the playback deadline from a present moment and based on client buffer duration. EX1006, ¶94.

Chou teaches changing the code rate to the determined code rate. EX1006, ¶95. Specifically, *Chou* states “[t]he client employs the encoder buffer parameters and the upper bound gap values to determine on a frame-by-frame basis the coding bit rate that will reduce a difference between the estimated latest anticipated arrival time of a frame under consideration and a prescribed target arrival time of that frame, in order to keep the client buffer at approximately the desired duration

level.” EX1004, ¶0025 (emphasis added). *Chou* further teaches “[i]f the current coding bit rate is below the arrival rate, and the client buffer duration begins to increase above its target level, then the coding bit rate can be switched up to a new coding bit rate above the arrival rate only if the new coding bit rate is below the conservative limit.” EX1004, ¶0123.

Chou also teaches starting reproduction of the content at the reproduction time. EX1004, ¶0059.

2. Wang

Wang (filed March 21, 2003; published September 23, 2004; issued October 20, 2009) is prior art under pre-AIA 35 U.S.C. §102(a) and 102(b).

Wang relates to multimedia streaming, and to receiver buffer fullness management of the multimedia streaming client. EX1016, 1:7-9, FIG. 3:

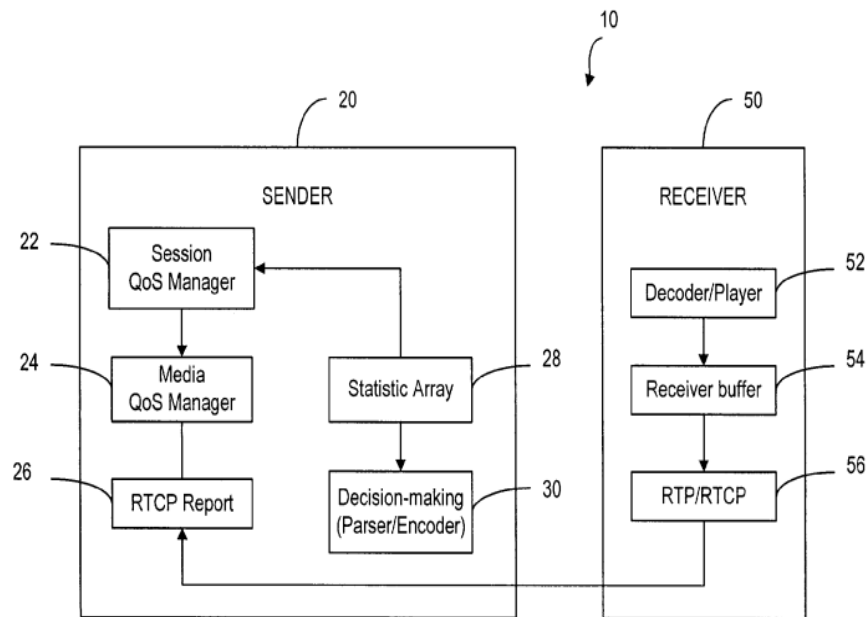


Fig. 3

Wang teaches a distribution system (multimedia streaming system) that transmits content data from a transmission device (sender) to a reception device (receiver). EX1016, 6:60-62, FIG. 3. In *Wang*, the transmission rate and/or nominal playout rate of the media is adjusted to maintain the receiver buffer fullness level. EX1016, 6:58-7:18. *Wang* describes “transmission rate and/or nominal playout rate” as the rate “at which streaming data is provided to the client.” EX1016, 3:30-32. Different media QoS (Quality of Session) managers of the sender provide rate adaptations for multiple media types. EX1016, 7:18-20.

Wang teaches the reception device storing received content data into a storage device (receiver buffer) and reproducing the content based thereon. Specifically,

Wang teaches a receiver's decoder/player processes packets from the receiver buffer and renders them to the playback device (decoder/player). EX1016, 6:60-65; Fig. 3.

Wang teaches determining the code rate based on a remaining time before reproduction start time and available reproduction time, and changing the code rate of the content to be transmitted to the determined code rate. EX1006, ¶101.

In *Wang*, processed information from the QoS manager is used to decide the adjustment required. EX1016, 7:10-13; EX1006, ¶102. *Wang* further teaches starting content reproduction at the set reproduction start time (scheduled playout time). EX1016, Abstract.

3. Admitted Prior Art

The '101 patent describes Patent Documents 1 and 2 as "Background Art," admitting they are prior art (Applicant Admitted Prior Art ("AAPA")), including describing "a *known* distribution system that includes a transmission device and a plurality of reception devices configured to be capable of communicating with each other." Ex 101, 1:11-13 (emphasis added).

a. Patent Document 1

Patent Document 1 (JP2005-191786; published July 14, 2005; original and certified English translation included as Exhibits EX1008, EX1013) is prior art under pre-AIA 35 U.S.C. §102(a) and 102(b). Patent Document 1 "includes a transmission device and a plurality of reception devices" configured to "allow[] the

plurality of reception devices to synchronously reproduce content.” EX1001, 1:11-16. Further, the “reproduction start time” is used to “match the positions to reproduce the content with each other among the plurality of reception devices.” EX1001, 1:16-31.

b. Patent Document 2 (Nobuyoshi)

Patent Document 2 (“Patent Document 2” or “*Nobuyoshi*”) (JP2007-013705; published on January 18, 2007; original and certified English translation included as Exhibits EX1009, EX1014) lists Tomita Nobuyoshi as inventor and is prior art under pre-AIA 35 U.S.C. §102(a) and 102(b). Patent Document 2 discloses “a system that allows a plurality of reception devices to synchronously reproduce content” by determining “reproduction start times” for the various reception devices and “match[ing] positions to reproduce content with each other.” EX1001, 1:32-49.

V. ’101 PATENT SUMMARY

A. Effective Filing Date

The ’101 patent issued from U.S. Application No. 13/508,025, filed on May 3, 2012, which was a national-stage filing of PCT Application No. PCT/JP2010/006067 (filed October 13, 2010), and claims priority to Japanese Patent Application No. 2009-253581 (filed November 5, 2009). Therefore, the ’101 patent’s effective filing date is not earlier than November 5, 2009.

B. Person of Ordinary Skill in the Art

A POSITA at the time of the alleged invention would have a bachelor's degree, or equivalent, in electrical engineering, computer science, a related field, and 2-3 years' experience researching, designing, or developing content delivery systems and related hardware, software, and firmware, or equivalent experience.³ One having less education but more practical experience, or more education and less experience, might also meet this standard. EX1006, ¶¶67-69.

C. Alleged Invention

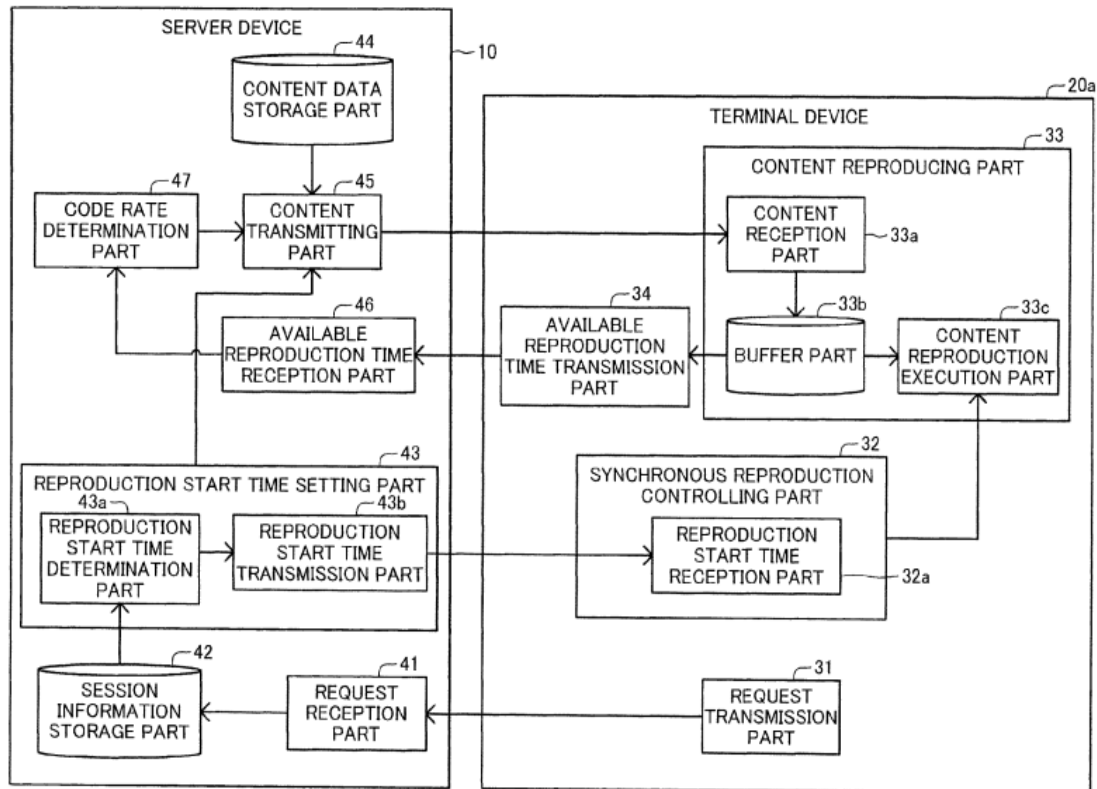
The '101 patent relates to a “distribution system” that “transmits content data representing content from a transmission device to a reception device.” EX1001, 1:5-7. The distribution system includes a transmission device (server device 10) and a reception device (terminal devices 20a-c) communicating with each other. EX1001, 5:13-20. Transmission device 10 includes a content transmitting means 45 for transmitting content data. EX1001, 2:30-31, 8:46-48. The content data is “one content coded with any one code rate of a plurality of code rates different from each other.” EX1001, 2:31-33, 8:48-52. Reception device 20a is equipped with a content reproducing means 33 for, while receiving the transmitted content data, storing received data into a storage device (buffer part

³ Reference herein to what a POSITA would have known, understood, or been motivated to do, and the like, refers to the time of the alleged invention.

33b) and reproducing the content based thereon. EX1001, 2:34-38, 9:51-55, FIG.

2.

Fig.2



The system determines the code rate based on (1) “a remaining time before reproduction start time,” and (2) “an available reproduction time.” EX1001, 2:43-46, 10:13-18. Content transmitting means 45 “change[s] the code rate” of the to-be-transmitted data to the determined code rate. EX1001, 2:47-49, 10:60-11:3, 15:54-57.

D. Prosecution History

The '101 patent's claims were allowed without any prior-art rejections.

EX1002. A Preliminary Amendment was filed upon entry into the U.S. National Stage that (1) changed various terms from “means” to “unit”; (2) removed multiple dependencies; (3) added other amendments; (4) added “computer-readable medium” to the program claims; and (5) added new claims 26-28. EX1002, 212-222.

Claims 21 and 26 were rejected by the Examiner under 35 U.S.C. § 101 for claiming a signal *per se*. EX1002, 34-38. Claims 21 and 26 were amended to add “non-transitory.” EX1002, 22-32. The application was allowed. EX1002, 8-15.

E. The Examiner Erred By Allowing The Challenged Claims

The '101 patent's claims were not inventive in light of the prior art. For example, *Chou*, *Wang*, and/or the admitted prior art render the Challenged Claims obvious. EX1006, ¶81.

The Examiner erred in allowing the '101 patent. Neither *Chou* nor *Wang* were before the U.S. Examiner. If the Examiner had the benefit of these references, their explanation herein, and the remaining background and technical discussions herein, the Challenged Claims would not have issued. EX1006, ¶82.

VI. CLAIM CONSTRUCTION

Petitioner interprets the Challenged Claims according to *Phillips*. 37 C.F.R. §42.100(B); 83 Fed. Reg. 51340, 51340-44 (Oct. 11, 2018); *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312 (Fed. Cir. 2005). Applying *Phillips* here, all terms have their plain and ordinary meaning.⁴

Although the parties have not exchanged claim constructions in the related district court proceeding, NEC served infringement contentions indicating NEC's claim interpretations. EX1031. As shown in the Reader Declaration, Petitioner is applying the prior art consistent with what appears to be NEC's interpretation of the claims as indicated in the Infringement Contentions. EX1006, ¶¶112, 120, 136, 157, 162, 167, 173, 179, 187. The infringement contentions are PO's statements before a Federal court on the scope of a patent claim and may thus be cited here per 35 U.S.C. §301(a)(2) and per §301(d) the Office may consider them to determine proper meaning of patent claims in IPR proceedings under §314. *Donnelly Distribution LLC v. Russo Trading Co., Inc.*, IPR2019-00761, Paper 8, 17-18 (PTAB Sept. 6, 2019).

⁴ Petitioner does not waive any litigation argument relating to scope, meaning, or invalidity.

VII. BACKGROUND

Streaming content from a server to a receiver, and buffering the content to maintain playback quality, was well known before the '101 patent. EX1004, ¶¶0004-0005; EX1006, ¶41. Buffering before decoding and playback was used to ensure changing network conditions did not prevent a good streaming experience. EX1006, ¶41. Changing the code rate of transmitted content data to control the buffer was also well known before the '101 patent. EX1004, ¶0031. EX1006, ¶¶41, 28-58, 70-77.

A. Steaming over the Internet

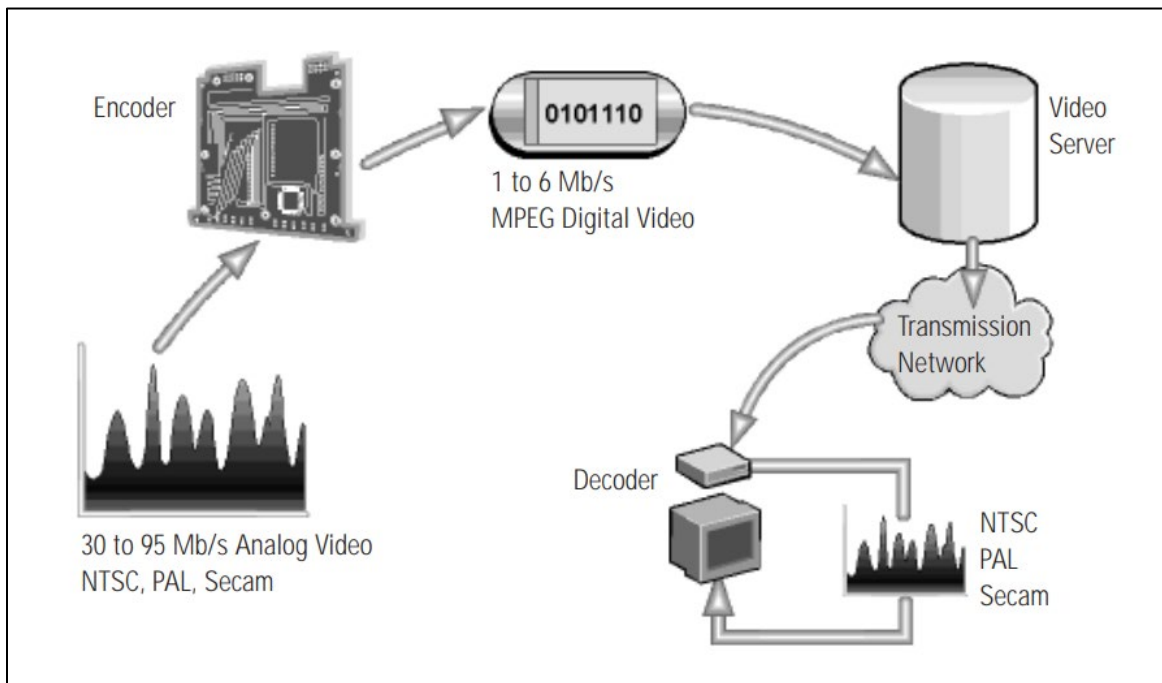
The growth of the internet in the 1990s led to an increase in streaming media. *See* EX1015. Streaming arose as an alternative to the “download-first-and-then play” technique. EX1016, 1:38-49. For streaming, “audiovisual data is packetized, delivered over a network, and played as the packets are being received....” EX1017, 2:9-13; EX1006, ¶¶42-43. By the late 1990s, media streaming “account[ed] for a significant, and expanding, portion of the Internet traffic.” EX1018, 250.

B. Video Coding Standards

To overcome bandwidth constraints, content data is compressed before transmission, which the recipient decompresses into the original form. EX1006, ¶42. By 2000, several standards for compression existed, including: MPEG-

2/H.262 (EX1020, EX1021), MPEG-4 (EX1022), and H.261 (EX1023). EX1006, ¶42.

As an example, the MPEG-2 standard requires a compliant bitstream created by the encoder implementors, focuses on “facilitat[ing] the bitstream interchange among different applications.” EX1021, 6; EX1006, ¶46. Thus, rather than “specify the architecture or implementation of encoders or decoders,” it defines a transport stream, allowing flexibility in implementing encoders/decoders. EX1024, vii; EX1006, ¶46. The following diagram depicts the general encoding/streaming/decoding process. EX1025, 1:



To increase streaming quality, the MPEG-4 standard increased coding efficiencies and error reconciliation. EX1022, 367; EX1006, ¶47.

C. Using Buffers in Video Coding Standards

To achieve high-quality, low-delay streaming, content buffering at the receiver prior to decoding and playback is required. EX1026, 1; EX1027, ¶0003; EX1006, ¶48. During buffering, the receiver collects a number of the streaming packets in memory before and during playout. EX1028, 1:42-51; EX1006, ¶¶48-49. This ensures a reserve of packets so if there is a delay in reception, playback continues. EX1015, 5; EX1006, ¶48.

Bandwidth and transmission medium degradations can cause variations in streaming rate. EX1029, 1; EX1027, ¶0036-0037; EX1006, ¶50. This can cause the buffer to deplete, which is also referred to as buffer underflow. EX1028, 1:52-2:6; EX1006, ¶50. In an effort to maintain video quality while preventing interruptions to playback, the transmission rate or code rate of data being transmitted is varied based network conditions. EX1029, 1; EX1006, ¶50.

Various methods of setting the transmission/code rate of a video stream based on buffer characteristics were known. EX1006, ¶51. For example, U.S. Patent No. 5,822,524 (EX1030) (filed 1995), discloses a system that controls the transmission/code rate based on the buffer's fullness level. EX1006, ¶51. Further, U.S. Patent No. 7,711,841 (EX1028) (published 2007), describes a system where buffer level is monitored (in time units) during playback and if it dips below a lower limit, playback rate is slowed. EX1006, ¶52. Moreover, International

Publication No. WO 2006/108435 (EX1007) (published 2006), describes a system that determines bit rate based on bandwidth and buffer status (such as buffer fill level and available playout length) such that if the buffer level or playout length surpass a threshold, the rate is changed. EX1006, ¶53.

As another example, the “Background Art” Section of the ’101 patent describes admitted prior in which the clients store content data into a buffer while receiving the content data. EX1001, 1:11-31; EX1006, ¶54. Similarly, the Background Section of PO’s related ’809 patent (EX1010) admits that Japanese Laid-Open Patent Publication No. 2004-172830—original and Certified English translation included as EX1011-EX1012—describes a “known” client/server delivery system in which, “[w]hile receiving the content data transmitted by the server device, the client device stores the received data of the content data in a storage device and reproduces the content based on the stored data.” EX1010, 1:13-37; EX1006, ¶54.

D. Synchronized Streaming to Multiple Recipients

The ’101 patent admits systems were “known” that “allow[] [a] plurality of reception devices to synchronously reproduce content.” EX1001, 1:11-15; EX1006, ¶56. Japanese Unexamined patent Application Publication No. 2005-191786—original and Certified English translation included as EX1008, EX1013—teaches a system that matches a clock within each reception device to a

reference clock, where each reception device then starts playback at a reproduction start time, thus synchronously reproducing content. EX1001, 1:16-31; EX1006, ¶57. Japanese Unexamined patent Application Publication No. 2007-13705—original and Certified English translation included as EX1009, EX1014—teaches synchronous playback even if the reproduction start time varies among the reception devices. EX1001, 1:32-49; EX1006, ¶58.

VIII. Discretionary Analysis for Review

Denial of institution under §325(d) would be inappropriate because this Petition relies on grounds and arguments not previously presented to the Office. The relied-upon art was not considered during prosecution.

The *General Plastic* factors do not weigh against institution as this is the only IPR filed against the '101 patent.

The *Fintiv* factors favor institution, which best serves the efficiency and integrity of the system. The related district court case, filed July 28, 2022, is in its early stages. While some fact discovery has occurred, PO's infringement claim chart was just served on June 26, 2023 (EX1031) and claim-construction briefing will not begin until November 1, 2023. Per the District Court's Scheduling Order (EX1036, 21-23), the claim construction hearing will not occur until February 13, 2024 and the trial won't occur until March 31, 2025. Moreover, if institution is granted, Petitioner won't assert in district court grounds that were raised or

reasonably could have been raised here, and intends to file a *Sotera* stipulation to that effect. Thus, *Fintiv* factors one (stay likelihood), two (trial date), three (proceeding investment), and four (issue overlap) all favor institution.

Only *Fintiv* factor five raises a potential question. While Petitioner and PO are the same parties in the district court, this is “far from an unusual circumstance” in IPR. *Sand Revolution II, LLC v. Cont’l Intermodal Grp.-Trucking LLC*, IPR2019-01393, Paper 24 (June 16, 2020) (instituting where parties were the same) (informative).

This Petition presents compelling evidence of unpatentability, showing that the Challenged Claims are obvious on multiple grounds. Petitioner’s expeditious analysis of the dozens of claims of PO’s three asserted patents (including U.S. Patent Nos. 8,909,809 and 9,769,427), and the timely filing of Petitions weighs against discretionary denial. *See Apple Inc. v. Seven Networks, LLC*, IPR2020-00506, Paper 11 at 16 (Sept. 1, 2020). Thus, *Fintiv* factor six (other circumstances) favors institution.

IX. CHALLENGED CLAIMS

A. Ground 1: Challenged Claims' Obviousness over *Chou*.

1. Claim 1

[1a] A distribution system, including a transmission device and a reception device configured to be capable of communicating with each other,
--

Chou teaches⁵ [1a]. EX1004, Abstract, ¶¶0002, 0019, 0021, 0031, 0060, 0115, FIGS. 2, 11A-C, claims 1, 47, 48; EX1006, ¶109.

Specifically, *Chou* is directed toward “a system and process for controlling a coding bit rate of streaming media data being transmitted to a client from a server over a computer network.” EX1004, ¶0019; *see also id.*, ¶¶0002, 0021, 0031, 0060 0115, claim 1, claim 47, and claim 48.

Figs. 11A-C further depict two-way communication between a “CLIENT” and “SERVER.” EX1006, ¶111.

⁵ “Teaches” herein represents “teaches or suggests,” or otherwise renders obvious.

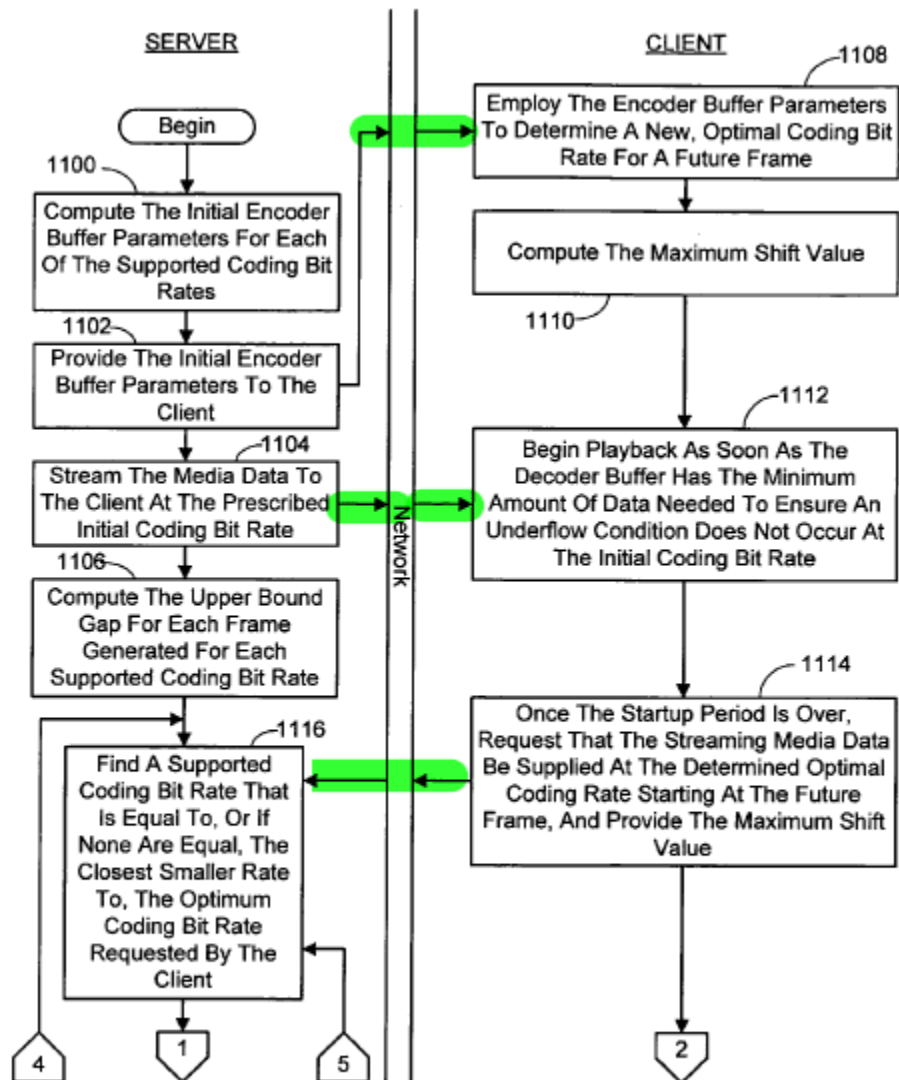


FIG. 11A

EX1004, FIG. 11A-C, FIG. 2.

[1b] the transmission device being equipped with a content transmitting unit for transmitting content data, which is one content coded with any one code rate of a plurality of code rates different from each other, to the reception device, and

Chou teaches [1b]. EX1004, ¶¶0019, 0021-0022, 0031, 0060, 0069-0070, 0089, 0091, 0109-0110, 0112, 0115, 0118, 0130, FIGS. 11A-C; EX1006, ¶113.

a. The transmission device being equipped with a content transmitting unit for transmitting content data...to the reception device

Chou teaches “the server transmits the streaming media data” (EX1004, ¶0021), and the streaming media data is “provided to the client” (EX1004, ¶0023). EX1006, ¶¶114-116; *see also* EX1004, ¶0019, 0060, 0031, FIGS. 2, 11A-C. *Chou* illustrates the server transmitting streaming media data to the client:

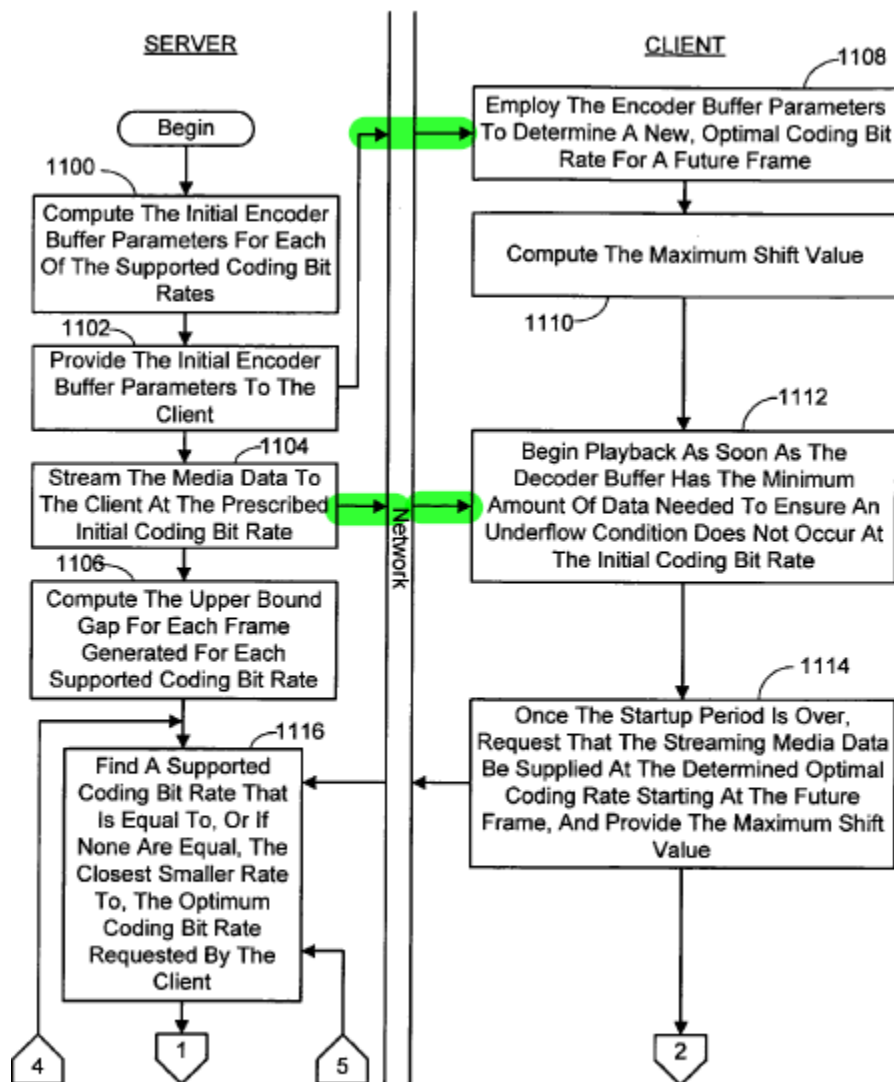


FIG. 11A

The server is implemented on “a general purpose computing device,” which “includes a modem 172 or other means for establishing communications over...the Internet,” and includes “program modules...that perform particular tasks” such as transmitting the streaming media data to the client. EX1004, ¶0048-0057, FIG. 1. EX1006, ¶115.

This is consistent with the '101 patent's disclosure of a transmission device and unit, where server device 10 is a transmission device that includes content transmitting part 45. EX1001, 5:12-16, 5:64-67, 8:46-58.

b. transmitting...one content coded with any one code rate of a plurality of code rates different from each other to the reception device

Chou discloses the “streaming media data...exhibits one of a number of coding bit rates.” EX1004, ¶¶0021, 0022, 0031, 0115 (“controlling a coding bit rate of streaming media data being transmitted to a client from a server over a computer network”), 0118, claim 2. *Chou* teaches that the coding bit rate can be expressed as “the average number of bits needed to encode one second of content,” which also teaches the number of bits needed to playout one second of content. EX1004, ¶0007; EX1006, ¶117.

Chou also teaches [1b] in FIGs. 11A-11C. For example, *Chou* teaches that the server streams media data (content) to the client at an initial coding rate (bit rate), which is one of a number of supported coding rates (one of a plurality of different bit rates). EX1006, ¶¶113-120; EX1004, ¶¶ 0115-0117.

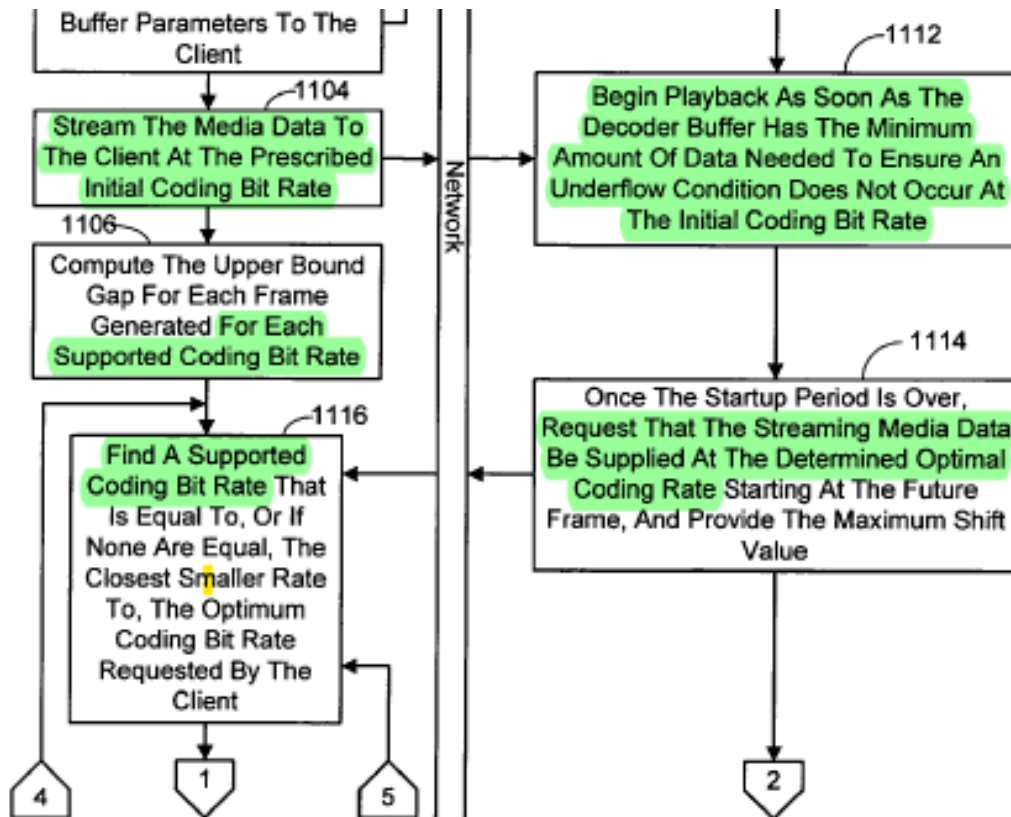


FIG. 11A

To the extent [1b] might be deemed a means-plus-function limitation, [1b] is still taught by *Chou*. As explained above and in [1e], *Chou* teaches the recited function. *Chou* also teaches a structure for the transmitting unit: a server implemented on “a general purpose computing device” (EX1004, ¶0051), which “includes a modem 172 or other means for establishing communications over...the Internet” (EX1004, ¶0057) and includes “program modules...that perform particular tasks” such as transmitting streaming media data to the client. EX1004, ¶0048-0057, FIG. 1, 11A; EX1006, ¶118. This is consistent with the ’101 patent’s

disclosure of a transmitting unit, where server device 10 is a “transmission device” that includes content transmitting part 45. EX1001, 5:12-16, 5:64-67, 8:46-58. Even if *Chou* were deficient (it isn’t), [1b]’s structure and functionality were generally known by POSITAs (see §VII), rendering it obvious. EX1006, ¶¶119, 28-58, 70-77.

[1c] the reception device being equipped with a content reproducing unit for, while receiving the content data transmitted by the transmission device, storing received data of the content data into a storage device and also reproducing the content based on the stored data,
--

Chou teaches [1c]. EX1004, Abstract, ¶¶0002, 0005, 0007, 0020, 0028, 0059, 0067, 0070, 0115 FIGS. 5, 11A-C; EX1006, ¶121.

Below, [1c] is analyzed in two parts: (1) while receiving the content data transmitted by the transmission device, storing received data of the content data into a storage device; and (2) while receiving the content data transmitted by the transmission device, also reproducing the content based on the stored data.

Regarding (1), *Chou* discloses: “Content enters the buffer when it arrives at the client over the network, at a rate of r_a/r_c seconds of content per second of real time.” EX1004, ¶0007, *see also*, ¶¶0019, 0021, 0023, 0031, 0113, 0115, 0117 and FIGS. 11A-C. This teaches part (1) of [1c]. EX1006, ¶123.

Regarding (2), *Chou* discloses the client “begin[s] playback...of the streaming media data when the client’s decoder buffer has the minimum amount of data therein

that is needed to ensure an underflow condition does not occur[.]” EX1004, ¶¶0028, 0115. The POSITA would have understood that when the minimum amount is reached, content begins playing out from the buffer while being received. EX1004, FIG. 6; EX1006, ¶124. Moreover, *Chou* discloses that “[o]ver time...the buffer remains relatively constant...since content is received and played back at the same speed *v*.” EX1004, ¶0075

Additionally, *Chou* teaches that it is important to “control buffer duration to prevent the buffer from underflowing.” EX1004, Abstract. The POSITA would have understood that buffer fullness and duration are impacted by buffer fill rate and the rate at which content is being played out from the buffer. EX1006, ¶125. Thus, *Chou* teaches [1c]. EX1006, ¶125.

Chou’s objective is driven by the reality that while content is filling the buffer (first part [1c]) the client is reproducing content, thereby draining the buffer (second part [1c]), which can lead to underflow and overflow. EX1006, ¶126. To avoid underflow (and playback delays), the POSITA would have understood to store content data into the buffer while being received. Likewise, to avoid overflow (and playback delays), the POSITA would have understood to playout content data from the buffer while being received. Thus, the POSITA would have understood that while receiving transmitted content data, the client is reproducing content from the stored data. EX1006, ¶126.

Chou further teaches that receiving/storing of content into the buffer is controlled to avoid underflow and allow for continuous playback from the buffer. EX1004, ¶0020; EX1006, ¶128. Thus, to avoid buffer underflow, *Chou* teaches storing the content in the buffer as it is received from the server, while simultaneously playing out content from the buffer. EX1006, ¶¶128-136.

Moreover, even if *Chou* were deficient (it isn't), AAPA also teaches [1c]. AAPA teaches that the reception device “stores received data among the content data into a storage device (a buffer) while receiving the content data” and reproduces “content based on the stored data at the reproduction start time.” EX1001, 1:11-31. Thus, the POSITA would have understood that the AAPA teaches [1c]. EX1006, ¶133.

To the extent [1c] might be deemed a means-plus-function limitation, *Chou* still teaches [1c], as explained above and in [1f]. *Chou* also teaches a structure for the content reproducing unit. Particularly, *Chou* discloses a client that “begins playback of the frames it has received as soon as its decoder buffer has the minimum amount of data that is needed to ensure an underflow condition does not occur at the initial coding bit rate and continues to playback each frame received thereafter (process action 1112).” EX1004, ¶0115. This is consistent with the '101 patent's disclosure of a content reproducing unit, which discloses that a generic “content reproducing part 33 [of terminal device 20a], while receiving content data

transmitted by the server device 10, stores received data of the content data into the storage device and reproduces content based on the stored data (performs streaming reproduction).” EX1001, 9:51-55. Even if *Chou* were deficient (it isn’t), [1c]’s structure and functionality were also generally known by POSITAs (*see, e.g.*, §VII), rendering it obvious even if not explicitly taught by *Chou*. EX1006, ¶¶135, 28-58, 70-77.

[1d] the distribution system, comprising a code rate determining unit for determining the code rate based on a remaining time before reproduction start time set as time at which the reception device starts reproduction of the content from a present moment and 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, wherein:

Chou teaches [1d]. EX1004, Abstract, ¶¶0007, 0019-0026, 0029-0032, 0067, 0069-0070, 0074, 0081, 0123, 0130, FIGS. 5-8, claims 1, 2, 13, 14; EX1006, ¶137.

a. The distribution system, comprising a code rate determining unit for determining the code rate...

Chou teaches “determining the code rate.” EX1006, ¶138. *Chou* discloses “the present system and process includes techniques for **determining the most appropriate coding bit rate**, from the available rates, in view of the optimum coding bit rate identified.” EX1004, ¶0031 (emphasis added); *id.*, ¶¶0022, 0081, 00115-00117, claims 2-5.

Chou also discloses “controlling a coding bit rate of streaming media data being transmitted to a client from a server,” which involves “dynamically adjusting the coding bit rate of the streaming media data.” EX1004, ¶¶0019-0026, 0029-0032, 0070.

Chou describes the coding bit rate as “the average number of bits needed to encode one second of content.” EX1004, ¶0007. *Chou*’s coding bit rate teaches the code rate claimed in the ’101 patent. EX1006, ¶140.

Chou teaches that the client or the server are code rate determining units. EX1004, ¶0031 (“for determining the most appropriate coding bit rate...the client itself would perform the analysis...[h]owever, in an alternate embodiment...the server would perform the analysis”). *Chou* reiterates that either the transmission device or the reception device can determine the code rate. EX1004, ¶0130 (“control process” can be either “receiver-driven” or “sender-driven”); EX1006, ¶142.

- b. [determining the code rate] based on a remaining time before reproduction start time set as time at which the reception device starts reproduction of the content from a present moment**

Chou teaches controlling the buffer duration to a desired amount. EX1006, ¶143. EX1004, ¶0019 (“coding bit rate control is formulated as a standard problem...in which the client buffer duration is controlled as closely as possible to

a target level.”). *Chou* teaches setting the coding bit rate to control frame arrival time to achieve this target buffer duration. EX1004, ¶¶0027-0029. EX1006, ¶143. This target buffer duration is the difference between the reproduction start time (the playback deadline) and the target scheduled arrival time. EX1004, ¶¶0027-0029, 0070-75. EX1006, ¶143.

Specifically, *Chou* discloses that “[i]n regard to the target arrival time for each frame, these are chosen [to] make the amount of time between the target time of a frame and its playback time large enough, after the startup period, that network jitter, delays and throughput changes which may cause the actual arrival time of the frame to be after its target arrival time do not result in the frame arriving after its scheduled playback time.” EX1004, ¶0027. In other words, in setting the target arrival time, “the amount of time between the target time of a frame and its playback time” must be considered. *Chou* further discloses 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.” EX1004, ¶0019. Based on this, a POSITA would have understood that selection of a code rate for encoding the frame at the present time in *Chou*, which determines the number of bits to be transmitted for the frame, is done such that the frame’s arrival time is as close to the target arrival time as possible under current network conditions. Because “the amount of time between the target time of a frame and its playback time” (EX1004,

¶0027) is known, the code rate is selected based on the “remaining time before reproduction start time set as time at which the reception device starts reproduction of the content from a present moment.”

Accordingly, *Chou* teaches that at the time of determining the code rate for a subject frame (the present moment), the code rate determining unit determines a playback deadline for the subject frame (the time reproduction will start from the present moment) and adjusts the code rate so that the subject frame arrives at the decoder buffer at or near its target scheduled arrival time. EX1004, ¶¶0027-0029, 0070-75. EX1006, ¶145. This target scheduled arrival time is selected to achieve a desired target buffer duration (or fullness), which is the difference between the determined reproduction start time and the target scheduled arrival time. EX1004, ¶¶0027-0029, 0070-75. EX1006, ¶145.

Particularly, FIG. 6 describes frame playback deadlines and a target arrival schedule used to achieve a desired target buffer duration. EX1004, ¶¶0070-75. EX1006, ¶146. *Chou* discloses that “[t]he gap between the playback deadline and the target schedule is the desired client buffer duration (in client time).” EX1004, ¶0074.

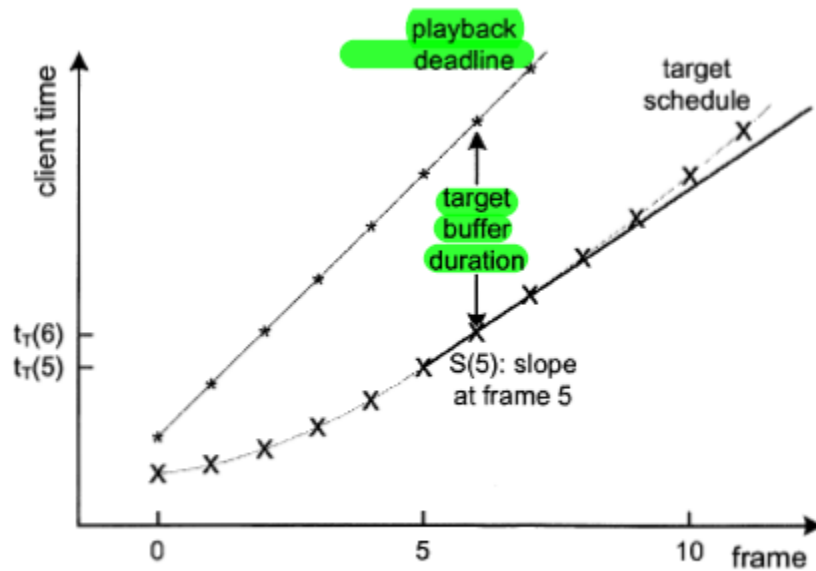


FIG. 6

This gap between the time at which *Chou*'s system is determining the coding bit rate for a given frame (to meet the target arrival schedule) and the playback deadline for that frame, is the claimed "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." EX1004, ¶¶0070-75. EX1006, ¶147. Thus, *Chou* teaches controlling coding rates based on the time available for reproducing the content based on the content data stored in the buffer. EX1004, ¶¶0070-75. EX1006, ¶147.

Chou further teaches that the system examines the target arrival schedule slope in adjusting the coding rate to attempt to meet that schedule. EX1004, ¶¶0070-75. EX1006, ¶148. *Chou* teaches using the relationship between the coding bit rate it is determining for a frame and the arrival time for that frame (based on the channel), and adjusting the rate to meet the target arrival schedule. EX1004, ¶¶0070-

75. EX1006, ¶148. Particularly, *Chou* discloses that “[t]he slope of the target schedule relates the average coding bit rate to the average arrival rate” and gives this relationship as $r_c(n)/r_a$, where r_c is the coding bit rate and r_a is the arrival rate. EX1004, ¶0075. EX1006, ¶148. Accordingly, 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. EX1006, ¶148.

c. And [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

Chou further teaches determining the code rate based on an available reproduction time as claimed. First, *Chou* discloses “controlling a coding bit rate of streaming media data being transmitted to a client from a server” involves “dynamically adjusting the coding bit rate of the streaming media data to control the buffer duration.” EX1004, ¶¶0019-0026, 0029-0032. The buffer duration is “[t]he size of the client buffer...expressed as the number of seconds of content in the buffer.” EX1004, ¶0007. Therefore, buffer duration indicates a “number of seconds of content” in the buffer. EX1004 ¶0007. EX1006, ¶149.

Furthermore, *Chou* teaches controlling buffer duration to a desired amount. EX1006, ¶150. *Chou* discloses “coding bit rate control is formulated as a standard

problem...in which the client buffer duration is controlled as closely as possible to a target level.” EX1004, ¶0019. Thus, *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).

Chou further discloses “regulating the coding bit rate so that the client buffer does not underflow” and “the arrival times of all frames will certainly be earlier than their playback deadlines” to insure uninterrupted playback.” EX1004, ¶0070. *Chou* illustrates playback deadlines in FIG. 5 as they relate to client time. EX1004, ¶0059, FIG. 5. EX1006, ¶152.

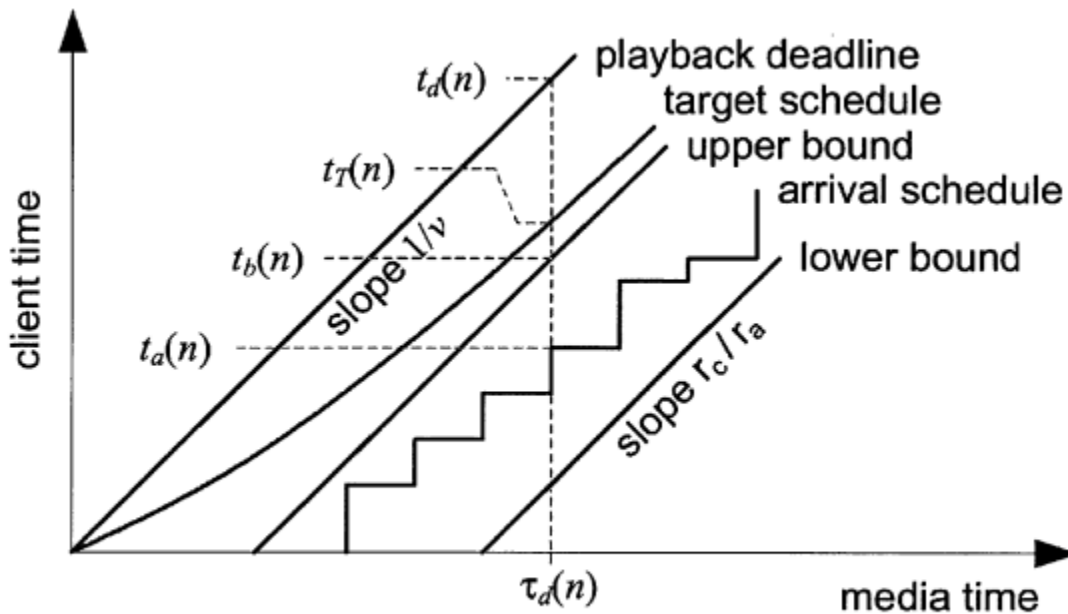


FIG. 5

At any time during playback, there are playback deadlines for frames yet to be played, and the time between a playback deadline of a frame and its arrival time

$(t_a(n)-t_a(n))$ is the remaining time before that frame is to be played. EX1004, ¶0067-0068, 0070, 0074, 0081, FIGs. 5-6. EX1006, ¶153. *Chou* refers to this time as the buffer duration. EX1004, ¶0067 (“[T]he gap between a frame’s arrival time and its playback deadline is the client buffer duration at the time of the frame arrival.”) EX1006, ¶153. Thus, *Chou* teaches “an available reproduction time, which is a time available for reproducing the content based on the content data stored in the storage device of the reception device,” as claimed. EX1006, ¶153.

If [1d] is deemed means-plus-function, [1d] is still taught by *Chou*. As explained above, *Chou* teaches the recited function. *Chou* also teaches a structure for the code rate determining unit in that either the client or the server are a code rate determining unit. EX1004, ¶0031 (“the client itself would perform the analysis...[h]owever, in an alternate embodiment...the server would perform the analysis”), ¶0130. EX1006, ¶154. This is similar to the ’101 patent, which states that “code rate determining part 47 of the server device...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.” EX1001, 10:7-18. [1d]’s structure and functionality were also generally known by POSITAs (*see, e.g.*, §VII), rendering it obvious even if not explicitly taught by *Chou*. EX1006, ¶¶156, 28-58, 70-77.

[1e] the content transmitting unit is configured to change the code rate of the content data to be transmitted to the reception device to the determined code rate; and
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Chou teaches [1e]. EX1004, Abstract, ¶¶0019, 0021, 0031, 0070; EX1006, ¶158.

For example, *Chou* teaches changing the code rate of the content data by generating or selecting a stream with a desired code rate. EX1004, ¶0031 (“[T]he server generates data streams that exhibit one of a number of coding bit rates supported by the server, and transmits data streams at the most appropriate supported coding bit rate closest to the rate requested by the client.”); EX1006, ¶159. *Chou* further discloses the client requests a rate and “the server transmits the streaming media data at the most appropriate supported coding bit rate closest to the rate requested by the client.” EX1004, ¶0021.

Chou further describes changing or switching the code rate with reference to FIG. 10 that “upon receiving the feedback [from the client], the server selects a stream with coding bit rate...as high as possible.” EX1004, ¶0098; EX1006, ¶160.

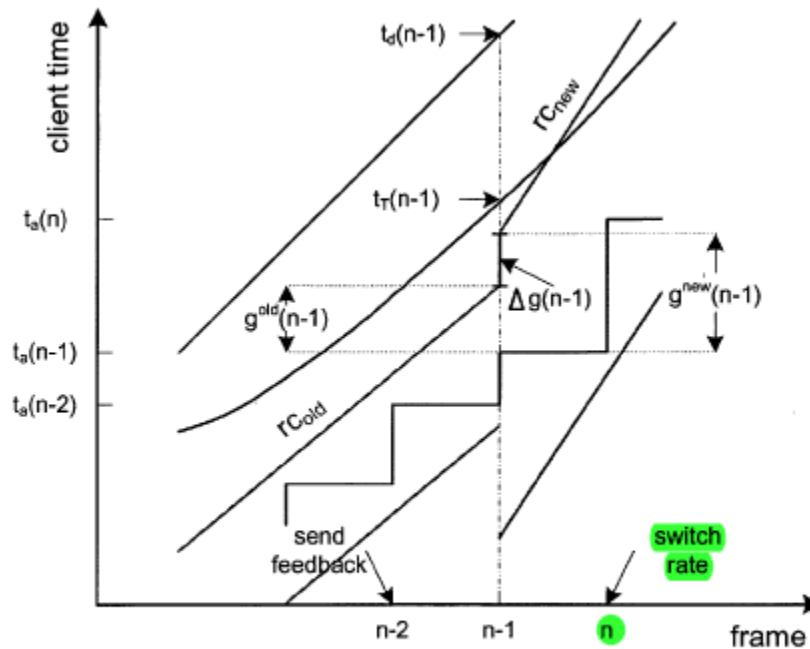


FIG. 10

[1e]’s functionality was also generally known by POSITAs (*see* §VII), rendering this limitation obvious. EX1006, ¶¶161, 28-58, 70-77.

[1f] the content reproducing unit is configured to start reproduction of the content at the set reproduction start time.

Chou teaches [1f]. EX1004, ¶¶0019-0020, 0059, 0067, 0115, FIG. 5.

EX1006, ¶163.

Chou discloses that the client provides “continuous playback” when the media data arrives before the “playback deadline..., which is the time...at which [a] frame...is scheduled to be played[.]” EX1004, ¶0067. EX1006, ¶164. The playback deadline is a “schedule at which frames are removed from the decoder

buffer and instantaneously decoded for presentation.” EX1004, ¶0060. Thus, for each frame received by the client, the client plays back the frame at its playback deadline. EX1004, ¶¶0060, 0067; EX1006, ¶164

Chou further explains in ¶0059 and ¶0067 that the playback deadline “is the time $t_d(n)$ at which frame n is scheduled to be played (after instantaneous decoding).” EX1004, ¶0067; EX1006, ¶165.

[1f]’s functionality was also generally known by POSITAs (see §VII), rendering this limitation obvious. EX1006, ¶166.

2. Claim 2

[2] The distribution system according to claim 1, wherein the code rate determining unit is configured to determine a value becoming smaller as the available reproduction time becomes shorter than a target available reproduction time, which is a target value of the available reproduction time, and becoming smaller as the remaining time becomes shorter, as the code rate.
--

Chou teaches [2]. EX1004, ¶¶0007, 0123, 0074-0075, 0070, 0093; EX1006, ¶168.

Chou teaches that “when the buffer [duration] drains...below its target level, the controller will rapidly switch the coding bit rate...down to the coding bit rate below the arrival rate.” EX1004, ¶0123. When the buffer duration (“seconds of content” available “in the buffer”) is below a target number of seconds, coding bit rate is switched down. EX1004, ¶¶0007, 0123; EX1006, ¶169. Thus, a smaller

rate is determined based on an available seconds of content in the buffer becoming shorter than a target seconds of content in the buffer.

Chou depicts this in FIG. 6:

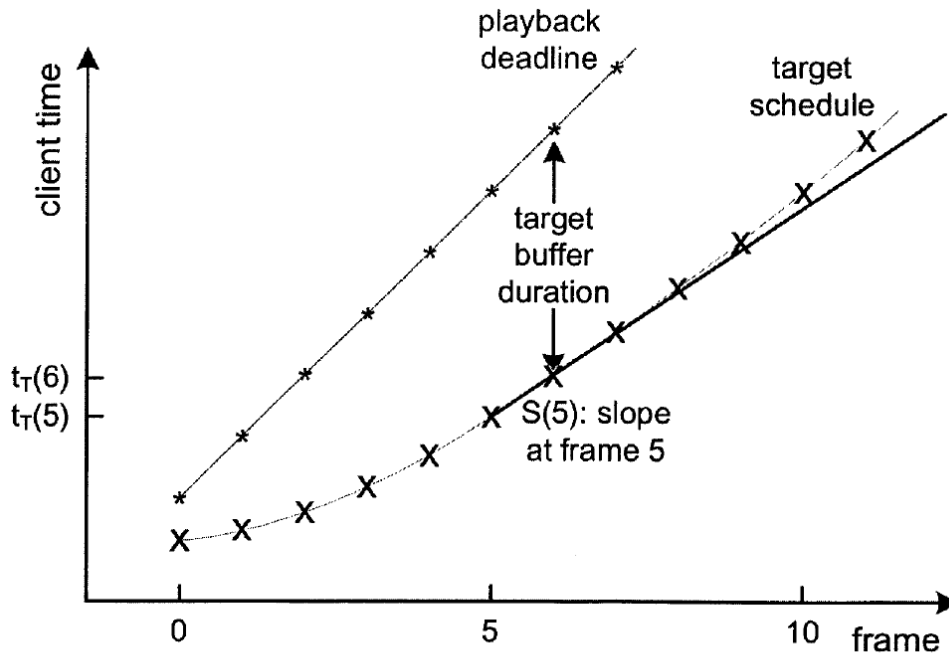


FIG. 6

Chou teaches that the “gap between the playback deadline and the target schedule is the desired client buffer duration.” EX1004, ¶0074. The slope of the target schedule at frame n is represented by “ $s(n)$,” which relates to the code rate based on the equation $s(n) = r_c(n)/r_a$ when the arrival rate is constant. EX1004, ¶0075. *Chou* then explains that “initially, when the slope was low,” i.e., the target buffer duration was small, more content is received per unit of time than is played out, “causing the client buffer...to grow.” EX1004, ¶0075. This is shown in FIG. 6, where the target buffer duration gets larger as the number of frames increases.

EX1006, ¶169. It can also be seen that as the target buffer duration gets larger, the slope of the target schedule gets larger, which, assuming constant arrival rate, the code rate also increases (based on the $s(n)$ equation). *Id.* As the target buffer duration gets larger, so too does the code rate. *Id.* Per the slope equation, the converse is also true. *See* EX1004, ¶0123 (“when the buffer drains back below its target level, the controller will rapidly switch the coding bit rate back down to the coding bit rate below the arrival rate”). As buffer duration decreases to smaller than the target buffer duration, the slope of the target schedule decreases so that the client buffer grows EX1006, ¶169. The result of this decreased slope equates to a decrease in the code rate, as shown the slope equation. Thus, as the buffer duration (available reproduction time) falls below a target buffer duration (target available reproduction time), the code rate decreases (gets smaller). EX1006, ¶170.

Furthermore, *Chou* teaches “regulating the coding bit rate” based on a “target schedule” that “introduce[s] a margin of safety” for the playback deadline. EX1004, ¶0070. *Chou* explains that when playback initially starts, “the target schedule starts at the same time as the playback deadline,” and normal behavior would be “decreasing the coding bit rate” because the remaining time between the present client time and the playback deadline is small. EX1004, ¶0093; EX1006, ¶170. This example confirms that normal behavior is to “decreas[e] the coding bit rate when the remaining time between the client time and the playback deadline is

short.” EX1004, ¶0093. Thus, *Chou* teaches that as the remaining time between the client time and the playback deadline is short (remaining time becomes shorter), then the coding bit rate is decreased, or smaller . EX1006, ¶171.

If claim 2 is deemed a means-plus-function claim , it is still taught by *Chou*. As explained immediately above, *Chou* teaches the recited function. Further, as explained in [1d], *Chou* teaches structure for the code rate determining unit.

3. Claim 4

[4] The distribution system according to claim 1, wherein the code rate determining unit is configured to determine the code rate with every change period set in advance.

Chou teaches [4]. EX1006, ¶174.

For example, *Chou* teaches “the coding bit rate” can be “adjusted” frame-by-frame as “each frame arrives at the client.” Ex1004, ¶0081, ¶0022, 0025, 0115; EX1006, ¶175.

Chou further teaches that frame rate can be constant. EX1004, ¶¶0079, 0069, 0084. *Chou* also teaches a virtual frame rate that is, for example, preset at “1 frame per second.” EX1004, ¶¶0084-0085. Thus, *Chou* teaches that code rate can be determined every time a virtual-frame-rate time elapses (e.g., once every second). EX1006, ¶176. This is akin to the ’101 patent’s description of the “change period,” which it describes as being “every time the transmission period

(the change period) elapses,” which, for example, can be “five seconds.” EX1001, 13:10-13, 15:35-39.

Thus *Chou* teaches [4]. EX1006, ¶177.

If [4] is deemed a means-plus-function claim, it is still taught by *Chou*. As explained immediately above, *Chou* teaches the recited function. Further, as explained in [1d], *Chou* teaches structure for code rate determining unit.

4. Claim 5

[5] The distribution system according to claim 1, further including a plurality of the reception devices, the distribution system further comprising a synchronous reproduction controlling unit for matching reproduction positions of the content to be reproduced by the plurality of the reception devices, respectively, with each other among the plurality of the reception devices.

Chou teaches [5].

Claim 5’s structure and functionality were generally known by POSITAs, rendering the claim obvious in view of *Chou* even if not explicitly taught by *Chou*. EX1006, ¶180.

The ’101 patent’s AAPA provides evidence of the POSITA’s knowledge at the time of the alleged invention. EX1001, 1:12-15 (“a known...plurality of reception devices...to synchronously reproduce content”), 1:15-31 (describing a system that “matches time of a clock disposed to each of the plurality of reception devices with time of a reference clock” so that the devices can start playback at a

synchronized reproduction start time). The AAPA further states the plurality of devices could “match positions to reproduce content with each other.” EX1001, 1:32-48. The AAPA is thus evidence that the POSITA’s knowledge included the limitations of [5]. EX1006, ¶183.

The AAPA may be used in this fashion in IPR to provide a factual foundation as to what a POSITA would have known. *Qualcomm Inc. v. Apple Inc.*, 24 F.4th 1367, 1376 (Fed. Cir. 2022) (citation omitted).

If [5] is deemed a means-plus-function claim, it is still taught by *Chou* as evidenced by AAPA. As explained above, *Chou* as evidenced by AAPA teaches the recited function. As shown in the AAPA, the structure was already known. EX1001, 1:32-49.

This is similar to the disclosure in the ‘101 patent, which states that “[w]hen the present time reaches the stored reproduction start time, the synchronous reproduction controlling part 32 outputs a reproduction start instruction.” EX1001, 8:37-45.

1. Claim 7

[7]	The distribution system according to claim 5, wherein the content transmitting unit is configured to, when second reproduction start time, which is reproduction start time set for a second reception device as one of the plurality of the reception devices, is later than first reproduction start time, which is reproduction start time set for a first reception device as another one of the plurality of the reception devices, estimate a reproduction position of the content being reproduced by the first reception device at the second reproduction start time and transmit a portion of the content data at and after the estimated reproduction position to the second reception device.
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Chou teaches [7].

Claim 7's structure and functionality were generally known by POSITAs, rendering the claim obvious in view of *Chou* even if not explicitly taught by *Chou*. EX1006, ¶188.

The '101 patent's AAPA shows the POSITA's knowledge. The AAPA discloses a system where "while a first reception device is reproducing content, a second reception device estimates a time required to start reproduction of the content...[c]onsequently, the transmission device transmits, to the second reception device, content data to be transmitted to the first reception device at and after the reproduction start time." EX1001, 1:32-49. EX1006, ¶189. Thus, [7] is obvious over *Chou* as shown by AAPA. EX1006, ¶189.

If [7] is deemed a means-plus-function claim , it is still taught by *Chou*. As explained above, *Chou* teaches the recited function. Further, as explained in [1b], *Chou* also teaches a structure for the content transmitting unit.

2. Claim 11

Claim 11 is substantially similar to claim 1, but is a method claim, and does not recite the content transmitting, content reproducing or the code rate determining units. EX1006, ¶191. For the same reasons explained in §IX.A.1, *supra*, *Chou* teaches claim 11.

[11a] A distribution method applied to a distribution system including a transmission device and a reception device configured to be capable of communicating with each other, the distribution method comprising:

See [1a]. *Chou* further teaches a “*process* for controlling a coding bit rate of streaming media data being transmitted to a client from a server[.]” EX1004, ¶0019 (emphasis added). EX1006, ¶192.

[11b] transmitting content data, which is one content coded with any one code rate of a plurality of code rates different from each other, to the reception device, by the transmission device;

See [1b].

[11c] while receiving the content data transmitted by the transmission device, storing received data of the content data into a storage device and also reproducing the content based on the stored data, by the reception device;

See [1c].

[11d] determining the code rate based on a remaining time before reproduction start time set as time at which the reception device starts reproduction of the content from a present moment, and 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;

See [1d].

[11e] changing the code rate of the content data to be transmitted to the reception device to the determined code rate, by the transmission device; and

See [1e].

[11f] starting reproduction of the content at the set reproduction start time, by the reception device.

See [1f].

3. Claim 12

[12a] The distribution method according to claim 11, further comprising:
[12b] determining a value becoming smaller as the available reproduction time becomes shorter than a target available reproduction time, which is a target value of the available reproduction time, and becoming smaller as the remaining time becomes shorter, as the code rate.

See claim 2. EX1006, ¶¶198, 168-173.

4. Claim 14

[14a] The distribution method according to claim 11, further comprising:
[14b] determining the code rate with every change period set in advance.

See claim 4. EX1006, ¶¶199, 174-179.

5. Claim 15

- [15a] The distribution method according to claim 11, applied to the distribution system including a plurality of the reception devices, the distribution method further comprising:**
- [15b] matching reproduction positions of the content to be reproduced by the plurality of the reception devices, respectively, with each other among the plurality of the reception devices.**

See claim 5. EX1006, ¶¶200, 180-187.

6. Claim 16

Claim 16 is substantially similar to [1a]-[1b], [1d]-[1e], but is drafted from the perspective of a transmission device rather than the distribution system.

EX1006, ¶201. *Chou* teaches operation by a client/reception device and/or a server/transmission device for any of [16] and its dependents. EX1004, ¶0031 (“for determining the most appropriate coding bit rate...the client itself would perform the analysis...[h]owever, in an alternate embodiment...the server would perform the analysis”), ¶0130 (“control process” can be either “receiver-driven” or “sender-driven”); EX1006, ¶201.

- [16a] A transmission device configured to be capable of communicating with a reception device, the transmission device comprising:**

See [1a]. EX1006, ¶¶202, 109-112.

[16b] a content transmitting unit for transmitting content data, which is one content coded with any one code rate of a plurality of code rates different from each other, to the reception device,

See [1b]. EX1006, ¶¶203, 113-120.

[16c] wherein the content transmitting unit is configured to change the code rate of the content data to be transmitted to the reception device to a code rate determined based on a remaining time before reproduction start time set as time at which the reception device starts reproduction of the content from a present moment and 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.

See [1d]-[1e]. EX1006, ¶¶204, 137-162.

7. Claim 17

[17a] The transmission device according to claim 16, further comprising:

[17b] a code rate determining unit means for determining the code rate based on the remaining time and the available reproduction time.

See [1d]. EX1006, ¶¶206, 137-157.

8. Claim 18

[18] The transmission device according to claim 16, wherein the code rate determining unit is configured to determine a value becoming smaller as the available reproduction time becomes shorter than a target available reproduction time, which is a target value of the available reproduction time, and becoming smaller as the remaining time becomes shorter, as the code rate.

See claim 2. EX1006, ¶¶207, 168-173.

9. Claim 20

[20] The transmission device according to claim 16, wherein the code rate determining unit is configured to determine the code rate with every change period set in advance.

See claim 4. EX1006, ¶¶208, 174-179.

10. Claim 21

Claim 21 is substantially similar to [1a]-[1b], [1d]-[1e], but performed by “[a] non-transitory computer-readable storage medium that stores a program comprising instructions.” EX1006, ¶209.

Chou teaches operation by a client/reception device and/or a server/transmission device. EX1004, ¶0031 (“for determining the most appropriate coding bit rate...the client itself would perform the analysis...[h]owever, in an alternate embodiment...the server would perform the analysis”), ¶0130 (“control process” can be either “receiver-driven” or “sender-driven”); EX1006, ¶210.

[21a] A non-transitory computer-readable storage medium that stores a program comprising instructions for causing a transmission device configured to be capable of communicating with a reception device

See [1a]. Additionally, *Chou* teaches that the disclosed process “may be described in the general context of computer-executable instructions, such as program modules, being executed by a computer.” EX1004, ¶0050, ¶¶ 0051-0055 (describing a computing system and computer readable media storing computer readable instructions for the computer), claim 46. EX1006, ¶211

[21b] to realize a content transmitting unit for transmitting content data, which is one content coded with any one code rate of a plurality of code rates different from each other, to the reception device,

See [1b].

[21c] wherein the content transmitting unit is configured to change the code rate of the content data to be transmitted to the reception device

See [1d].

[21d] to a code rate determined based on a remaining time before reproduction start time set as time at which the reception device starts reproduction of the content from a present moment, and 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.

See [1c].

11. Claim 22

Claim 22 is substantially the same as claim 1, except claim 22 is recited from the perspective of the reception device. EX1006, ¶215. Therefore, *Chou* anticipates and renders obvious the limitations of claim 22. *Supra* §VII.A.1.

[22a] A reception device configured to be capable of communicating with a transmission device, the reception device comprising:

See [1a].

[22b] a content reproducing unit for, while receiving content data, which is one content coded with any one code rate of a plurality of code rates different from each other and is transmitted by the transmission device, storing received data of the content data into a storage device and also reproducing the content based on the stored data; and

See [1b]-[1c].

[22c] a code rate determining unit for determining the code rate based on a remaining time before reproduction start time set as time to start reproduction of the content from a present moment and 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,

See [1d].

[22d] wherein the content reproducing unit is configured to receive content data coded with the determined code rate and start reproduction of the content at the set reproduction start time.

See [1c], [1e]-[1f].

12. Claim 23

[23] The reception device according to claim 22, wherein the code rate determining unit is configured to determine a value becoming smaller as the available reproduction time becomes shorter than a target available reproduction time, which is a target value of the available reproduction time, and becoming smaller as the remaining time becomes shorter, as the code rate.

See claim 2. EX1006, ¶¶220, 168-173.

13. Claim 25

[25] The reception device according to claim 22, wherein the code rate determining unit is configured to determine the code rate with every change period set in advance.

See claim 4. EX1006, ¶¶221, 174-179.

14. Claim 26

Claim 26 is substantially similar to claim 1, but from the perspective of the reception device, except claim 26 recites “[a] non-transitory computer-readable storage medium that stores a program comprising instructions” for performing these limitations. EX1006, ¶222. *Chou* teaches claim 26.

[26a] A non-transitory computer-readable storage medium that stores a program comprising instructions for causing a reception device configured to be capable of communicating with a transmission device to realize:

See [1a]. Additionally, *Chou* teaches that the disclosed process “may be described in the general context of computer-executable instructions, such as program modules, being executed by a computer.” EX1004, ¶0050, ¶¶ 0051-0055, claim 46. EX1006, ¶223

[26b] a content reproducing unit for, while receiving content data, which is one content coded with any one code rate of a plurality of code rates different from each other and is transmitted by the transmission device, storing received data of the content data into a storage device and also reproducing the content based on the stored data; and

See [1b]-[1c]. EX1006, ¶¶224, 113-136.

[26c] a code rate determining unit for determining the code rate based on a remaining time before reproduction start time set as time at which the reception device starts reproduction of the content from a present moment, and 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,

See [1d]. EX1006, ¶¶225, 137-157.

[26d] wherein the content reproducing unit is configured to receive content data coded with the determined code rate and start reproduction of the content at the set reproduction start time.

See [1c], [1e]-[1f]. EX1006, ¶¶226, 121-136, 158-167.

15. Claim 27

Claim 27 is substantially similar to claim 1, except claim 27 recites “a content transmitting means”, “a content reproducing means”, and “a code rate determining means.” EX1006, ¶227. *Chou* teaches claim 27.

[27a] A distribution system, including a transmission device and a reception device configured to be capable of communicating with each other,

See [1a]. EX1006, ¶¶228, 109-112.

[27b] the transmission device being equipped with a content transmitting means for transmitting content data, which is one content coded with any one code rate of a plurality of code rates different from each other, to the reception device, and

See [1b]. EX1006, ¶¶229, 113-120.

[27c] the reception device being equipped with a content reproducing means for, while receiving the content data transmitted by the transmission device, storing received data of the content data into a storage device and also reproducing the content based on the stored data,

See [1c]. EX1006, ¶¶230, 121-136.

[27d] the distribution system, comprising a code rate determining means for determining the code rate based on a remaining time before reproduction start time set as time at which the reception device starts reproduction of the content from a present moment and 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, wherein:

See [1d]. EX1006, ¶¶231, 137-157.

[27e] the content transmitting means is configured to change the code rate of the content data to be transmitted to the reception device to the determined code rate; and

See [1e]. EX1006, ¶¶232, 158-162.

[27f] the content reproducing means is configured to start reproduction of the content at the set reproduction start time.

See [1f]. EX1006, ¶¶233, 163-167.

16. Claim 28

Claim 28 is substantially similar to claim 16, reciting claim 1 from the perspective of the transmission device, except claim 28 recites “a content transmitting means”. EX1006, ¶234. *Chou* teaches the limitations of claim 28.

[28a] A transmission device configured to be capable of communicating with a reception device, the transmission device comprising:

See [1a]. EX1006, ¶¶235, 109-112.

[28b] a content transmitting means for transmitting content data, which is one content coded with any one code rate of a plurality of code rates different from each other, to the reception device,

See [1b]. EX1006, ¶¶236, 113-120.

[28c] wherein the content transmitting means is configured to change the code rate of the content data to be transmitted to the reception device to a code rate determined based on a remaining time before reproduction start time set as time at which the reception device starts reproduction of the content from a present moment and 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.

See [1d]-1[e]. EX1006, ¶¶237, 137-162.

To the extent that PO argues that this limitation must be performed by the transmission device, *Chou* teaches this (*see* [1d]).

17. Claim 29

Claim 29 is substantially similar to claim 22, reciting claim 1 from the perspective of the reception device, except claim 29 recites “a content reproducing means” and “a code rate determining means.” EX1006, ¶239. *Chou* teaches claim 22.

[29a] A reception device configured to be capable of communicating with a transmission device, the reception device comprising:

See [1a]. EX1006, ¶¶240, 109-112.

[29b] a content reproducing means for, while receiving content data, which is one content coded with any one code rate of a plurality of code rates different from each other and is transmitted by the transmission device, storing received data of the content data into a storage device and also reproducing the content based on the stored data; and

See [1b]-[1c]. EX1006, ¶¶241, 113-136.

[29c] a code rate determining means for determining the code rate based on a remaining time before reproduction start time set as time to start reproduction of the content from a present moment and 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,

See [1d]. EX1006, ¶¶242, 137-157.

[29d] wherein the content reproducing means is configured to receive content data coded with the determined code rate and start reproduction of the content at the set reproduction start time.

See [1c], [1e]-[1f]. EX1006, ¶¶243, 121-136, 158-167.

B. Ground 2: Challenged Claims' Obviousness over *Chou* in View of *Wang*

1. Claim 1

For [1a]-[1c], [1e]-[1f], *see* Ground 1 .

[1d] the distribution system, comprising a code rate determining unit for determining the code rate based on a remaining time before reproduction start time set as time at which the reception device starts reproduction of the content from a present moment and 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, wherein:

See Ground 1, [1d].

If PO argues *Chou* doesn't teach [1d], *Wang* does. EX1006, ¶249.

Wang discloses adjusting “the transmission rate and/or nominal playout rate of the different media to maintain the receive buffer fullness level.” EX1016, 7:13-20. EX1006, ¶250.

The remaining playout duration in time is provided by identifying a selected packet to be played out and a time difference between the current time (present moment) and the playout time (reproduction start time) of the selected packet (remaining time). EX1016, 3:33-36, Abstract, claim 1. Specifically, *Wang* teaches that the “buffer contains a plurality of RTP packets” that each “has a sequence number and playout timestamp known to the sender” making it “possible for the sender to know the playout time of any sequence number RTP packet...if the sender has timing information indicative of the scheduled playout time of any RTP packet.” EX1016, 5:8-19. The sender obtains this information from the receiver, which provides a sequence number (SN_x) and “the time difference between the current time and the scheduled playout time of packet x” (T_x). EX1016, 5:35-37, 6:39-44. This

is the difference between a present moment and a scheduled playout time (i.e., reproduction start time) of the selected packet (i.e., remaining time). EX1006, ¶251.

Using the timing information, “the sender calculates the amount of time it would take for the receiver buffer to empty if the receiver continues to playout at normal speed” (i.e., the available reproduction time). EX1016, Abstract, 3:44-47. Specifically, *Wang* teaches that “ T_{last} is equivalent to the current actual receiver buffer fullness level,” (“represented as remaining playout duration in time”) which can be calculated based on the values of “ SN_x and T_x ” obtained from the receiver. EX1016, 5:20-24, 5:35-37, 5:57-59. EX1006, ¶252.

The “receiver buffer fullness level” is used to adjust the transmission rate and/or nominal playout rate. EX1016, Abstract. “For example, the server can change the transmission characteristic by bitstream switching” (i.e. code rate switching), among other characteristics. EX1016, 6:31-37. Accordingly, *Wang* teaches changing the code rate, based on receiver buffer fullness level (available reproduction time), and based on the sequence number of a selected RTP packet in the receiver buffer and the time difference between the scheduled playout time of this packet and the current time (remaining time before reproduction start time). EX1006, ¶253. That is, *Wang* teaches calculating a change in code rate based on both the remaining time before reproduction start time and an available reproduction time, as required by [1d]. EX1006, ¶¶254-257.

These teachings of *Wang* can also be applied in situations where content is being received into the buffer but the initial content playback (i.e., the start of the content being played back) has yet to begin. *Wang* teaches that information can be provided indicating “ T_{first} ”, which corresponds to “the time difference between the current time and the scheduled playout time of” the first packet in the buffer. EX1016, 5:32-44. This discloses [1d]’s “remaining time before reproduction start time set as time at which the reception device starts reproduction of the content from a present moment.” Further, *Wang* teaches that based on this information, “the current actual receiver buffer fullness level” can be calculated (EX1016, 5:35-44)—i.e., [1d]’s required available reproduction time. EX1006, ¶257 As an example, assume a situation where packets are transmitted at one packet per second, and five packets, each constituting one second of playback time, have been received and stored in the buffer of the reception device. Further, assume that playback is set to begin when eight packets are received in the buffer. In this example, *Wang*’s T_{first} indicates the amount of time that will elapse between a current time and when the first packet in the buffer gets played back, which is three seconds (i.e., the amount of time it takes for the buffer to get from holding five packets to holding eight packets, which is three seconds at a one-packet-per-second transmission rate). Based on this, *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). Thus, *Wang* also teaches the requirements of [1d] in the situation where playback has yet to begin. EX1006, ¶257.

2. Claims 2, 4, 5, 7, 11, 12, 14-18, 20-23, 25-29

As shown in Ground 1, independent claims 11, 16, 21-22 and 26-29 are substantially similar to claim 1. *Supra* §IX.A. Therefore, *Chou* in view of *Wang* teaches claims 11, 16, 21-22 and 26-29 for the same reasons as claim 1 of Ground 2 and claims 11, 16, 21-22 and 26-29 of Ground 1. Similarly, dependent claims 2, 4, 5, 7, 12, 14-15, 17-18, 20, 23 and 25 are taught by *Chou* in view of *Wang* at least for the same reasons as in Ground 1. *Supra* §IX.A.

C. Ground 3: Claims 5, 7, and 15 Are Obvious over *Chou* and *Nobuyoshi*

1. Claim 5

[5a]	The distribution system according to claim 1, further including a plurality of the reception devices,
[5b]	the distribution system further comprising a synchronous reproduction controlling unit for matching reproduction positions of the content to be reproduced by the plurality of the reception devices, respectively, with each other among the plurality of the reception devices.

Chou in view of *Nobuyoshi* (AAPA Patent Document 2) teaches [5].

EX1006, ¶263.

Nobuyoshi teaches “that different Mobile terminals may participate in simultaneous playback.” EX1014, ¶¶0003-0004; EX1006, ¶264.

Nobuyoshi also teaches an “information processing device...acquiring the playback elapsed time information indicating the elapsed time since the start of playback of content data from each player terminal or transmitter terminal” and “a playback start time determination means for determining a playback start time of content data based on elapsed time information according to a delay time required for data communication with a transmitter terminal.” EX1014, ¶¶0011. Thus, “content data from the start time of playback supplied by the transmitter terminal can be played simultaneously from the middle of the same content data as that of the player terminal being played simultaneously by the information processing device by playing the content data from the start time of playback supplied by the transmitter terminal while each player terminal is playing the content data simultaneously.” EX1014, ¶¶0012; EX1006, ¶265.

2. Claim 7

[7] **The distribution system according to claim 5, wherein the content transmitting unit is configured to, when second reproduction start time, which is reproduction start time set for a second reception device as one of the plurality of the reception devices, is later than first reproduction start time, which is reproduction start time set for a first reception device as another one of the plurality of the reception devices, estimate a reproduction position of the content being reproduced by the first reception device at the second reproduction start time and transmit a portion of the content data at and after the estimated reproduction position to the second reception device.**

Chou in view of *Nobuyoshi* teaches [7]. EX1006, ¶266.

Nobuyoshi teaches a system including a PDA, a mobile phone, and a digital camera (any of which being the first reception device) as well as a notebook PC (the second reception device). EX1014, ¶0020-0021. *Nobuyoshi* teaches that the PDA, mobile phone, and digital camera can start playing content simultaneously (reproduction start time for a first reception device). EX1014, ¶0025-0026, 0028 (explaining the playback starts at the same time for the PDA, mobile phone, and digital camera). EX1006, ¶267.

Nobuyoshi teaches that the notebook PC can “start[] simultaneous playback processing from the midway of the moving image content” being played at the other devices EX1014, ¶0027. That is, the reproduction start time for the notebook PC (second reception device) is necessarily later than the reproduction start time of the other devices—i.e., the second reproduction start time is later than

the first reproduction start time. To accomplish simultaneous playback, information is transmitted to the notebook PC allowing it to match “its clock with master clock information and synchronize[] it,” allowing it “match the playback timing of the moving image content” at the other player terminals (PDA, etc.).

EX1014, ¶0029-0032. Thus, *Nobuyoshi* teaches [7]. EX1006, ¶268.

3. Claim 15

- [15a] The distribution method according to claim 11, applied to the distribution system including a plurality of the reception devices, the distribution method further comprising:**
- [15b] matching reproduction positions of the content to be reproduced by the plurality of the reception devices, respectively, with each other among the plurality of the reception devices.**

See claim 5. EX1006, ¶¶269, 263-265.

D. Motivation to Combine

The motivation-to-combine inquiry asks “whether a skilled artisan would have been motivated to combine the teachings of the prior art references to achieve the claimed invention.” *Allied Erecting & Dismantling Co. v. Genesis Attachments, LLC*, 825 F.3d 1373, 1381 (Fed. Cir. 2016) (internal quotation omitted). “The inquiry is not whether a relevant artisan would combine a first reference's feature with a second reference's feature to meet requirements of the first reference that are not requirements of the claims at issue.” *Axonics, Inc. v. Medtronic, Inc.*, No. 2022-1451, 2023 WL 4410686, at *5 (Fed. Cir. July 10, 2023). “[T]he real question is

why a person of ordinary skill in the art would have combined elements from specific references *in the way the claimed invention does.*” *Id.*

1. Motivation to Combine for Ground 2

a. *Chou, Wang, and the '101 patent all manage buffer duration/fullness (based on time) in order to prevent buffer underflow*

Chou discloses “a system and process for controlling a coding bit rate of streaming media data being transmitted to a client from a server over a computer network.” EX1004, ¶0019. “[T]his coding bit rate control involves dynamically adjusting the coding bit rate of the streaming media data to control the client buffer duration.” EX1004, ¶0019. “The purpose of this is to prevent the client buffer from underflowing...meets two of the aforementioned user expectations. Namely, if the buffer never underflows, it allows for continuous playback. In addition, keeping the average coding bit rate close to the average transmission bit rate of the network means the data is played back with the highest possible quality given the average communication bandwidth available.” EX1004, ¶¶0019-0020; EX1006, ¶271.

Wang similarly “relates generally to multimedia streaming and, more particularly, to receiver buffer fullness management of the multimedia streaming client.” EX1016, 1:8-10. Also like *Chou*, *Wang* discloses that the purpose for managing receiver buffer fullness is “to avoid buffer underflow (i.e. playout interruption).” EX1016, 1:21-27. That is, both *Chou* and *Wang* teach and disclose a

system that controls the client's buffer duration/fullness in order to prevent underflow. This is directly related to the claims of the '101 patent, which recite adjusting the code rate in order to control the client's buffer. EX1006, ¶272.

Finally, *Chou*, *Wang*, and the '101 patent all view buffer duration/fullness in terms of time. For example, *Chou*, discloses that “[t]he size of the client buffer can be expressed as the number of seconds of content in the buffer, called the buffer duration.” EX1004, ¶0007. *Wang* similarly discloses that “the sender calculates the *amount of time* it would take for the receiver buffer to empty if the receiver continues to playout at normal speed and no further RTP packets arrive to the receiver buffer.” EX1016, Abstract (emphasis added). The '101 patent specifically requires the use of time in the claims (i.e., “remaining *time* before reproduction start time” and “*time* available for reproducing the content”). EX1006, ¶273.

b. *Chou* and *Wang* both measure similar buffer characteristics to the '101 patent

Chou discloses controlling the code rate (as a means to prevent buffer underflow) based on arrival time of a frame so that “[i]n regard to the target arrival time for each frame, these are chosen so as to make the amount of time between the target time of a frame and its playback time large enough, after the startup period, that network jitter, delays and throughput changes which may cause the actual arrival time of the frame to be after its target arrival time do not result in the frame arriving

after its scheduled playback time.” EX1004, ¶0027. In other words, *Chou* chooses the most appropriate code rate in order to ensure that a frame’s arrival time is such that “the amount of time between the target time of a frame and its playback time” is large enough to handle variations in the network. Further, *Chou* discloses “dynamically adjusting the coding bit rate of the streaming media data to control the buffer duration,” which is “[t]he size of the client buffer...expressed as the number of seconds of content in the buffer.” EX1004, ¶¶0007, 0019-0026, 0029-0032. Thus, two factors *Chou* utilizes in determining whether to adjust the code rate to prevent underflow are (1) the amount of time between arrival of a frame and its playback time, and (2) the number of seconds of data available on the buffer. EX1006, ¶274.

Wang similarly discloses controlling code rate (as a means to prevent buffer underflow) based on “the sequence number of any RTP packet in the receiver buffer and the time difference between the scheduled playout time of this packet and the current time.” EX1016, 2:53-57. Further, *Wang* discloses providing “the actual receiver buffer fullness level in a receiver of [] RTP packets at a certain time instant represented as the remaining playout duration in time” which reflects “the amount of time it would take for the receiver buffer to deplete if no new RTP packets are added to the buffer.” EX1016, 2:50-66. Thus, two factors *Wang* utilizes in determining whether to adjust the transmission rate to prevent underflow are (1) the

time difference between a frame and its scheduled playout time, and (2) the amount of time available on the buffer to be played back. EX1006, ¶275.

The two buffer characteristics measured by *Chou* and *Wang* are directly related to the claims of the '101 patent, which determine code rate based on (1) the “remaining time before...[a] time at which the reception device starts reproduction of the content from a present moment” and (2) “a time available for reproducing the content based on the content data stored in the storage device” (i.e., buffer). EX1006, ¶276.

c. *Chou* and *Wang* both disclose controlling code rate to control buffer duration/fullness to prevent buffer underflow

Chou primarily focuses on managing buffer duration by controlling the code rate (which *Chou* describes as “the average number of bits needed to encode one second of content”) of the content being transmitted over the network. EX1004, ¶0007. However, *Chou* also recognizes that “the buffer duration can be increased by increasing r_a , decreasing r_c , and/or decreasing v (and vice versa for decreasing the buffer duration),” where r_a “is the arrival rate, or average number of bits that arrive at the client per second of real time,” r_c is the code rate, and v is the playback rate. EX1004, ¶0007. *Wang* manages buffer duration by controlling the transmission characteristics of content over the network (EX1016, Abstract), including the code rate. EX1006, ¶277.

**d. A POSITA would have been motivated to combine
Chou and *Wang***

Wang teaches a system that provides additional precision in the timing information utilized to determine buffer fullness based on feedback provided from the receiver. EX1016, Abstract, 1:64-2:16, 2:50-3:9. This would further advance *Chou*'s objective to provide optimum quality received content data within the available channel bandwidth to. EX1004, Abstract (“Using the theory of optimal linear quadratic control, the client buffer duration is kept as close as possible to a target level while still keeping the coding bit rate (and hence the quality) as constant as possible.”), ¶¶0019-21; EX1006, ¶278.

The Supreme Court has stated that “[t]he combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results.” *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 416 (2007). Here, the combination of *Chou* and *Wang* are a combination of familiar elements utilizing familiar concepts. Both *Chou* and *Wang* disclose the familiar components of a streaming system, such as a transmission device and reception device that includes a buffer for storing content. Both *Chou* and *Wang* also address the familiar concept of managing a reception device's buffer duration by controlling transmission characteristics (in this case, coding bit rate). Thus, the combination of *Chou* and

Wang is a combination of familiar elements according to known methods to yield predictable results. EX1006, ¶279.

I also understand the Supreme Court has explained that “if a technique has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way, using the technique is obvious.” *KSR*, 550 U.S. at 417. This would also apply to the combination of *Chou* and *Wang*. For example, *Wang* improves its ability to accurately control buffer characteristics of a reception device by more accurately determining (1) the time difference between a present moment and the frame’s scheduled playout time, and (2) the amount of time available on the buffer to be played back. This is then used in *Wang* to determine whether, and by how much, a coding bit rate should be changed such that a desired buffer fullness can be maintained. Because *Chou* also discloses a desire to maintain a reception device’s desired buffer fullness by controlling a coding bit rate, a POSITA would have recognized that the techniques used to improve the devices and concepts disclosed in *Wang* could also be used to improve the similar devices and concepts disclosed in *Chou*, making the use of that technique obvious. EX1006, ¶280.

Therefore, a POSITA would have been motivated to combine the teachings in *Chou* with the teachings in *Wang*. Specifically, 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. EX1006, ¶278-282.

2. Motivation to Combine for Ground 3

The prior art and the '101 patent contain ample teachings to motivate a POSITA to revise the operation of *Chou* to perform synchronous reproduction across a plurality of devices taught by *Nobuyoshi*.

First, the AAPA admits that “[t]here is a known distribution system that includes a transmission device and a plurality of reception devices configured to be capable of communicating with each other and allows the plurality of reception devices to synchronously reproduce content.” EX1001 at 1:11-15. Admissions such as this in the challenged patent can be used to...“support a motivation to combine particular disclosures [or] demonstrate the knowledge of the ordinary-skilled artisan at the time of the invention.” See June 9, 2022 USPTO’s Updated Guidance On The Treatment Of Statements Of The Applicant In The Challenged Patent In Inter Partes Reviews Under § 311 (“AAPA Guidance”), at 4. A POSITA would have been motivated to apply *Chou*’s techniques of “controlling the coding bit rate of streaming media” (EX1004, ¶0002) in the architectures of *Nobuyoshi* that stream media to multiple reception devices at least because, as the '101 patent admits, a POSITA would have known of a media streaming system that includes a plurality of reception devices. EX1006, ¶284.

Second, *Chou* explains that its teachings are “operational with numerous other general purpose or special purpose computing system environments or configurations” including “distributed computing environments where tasks are performed by remote processing devices that are linked through a communications network.” EX1004, ¶¶0049-0050. Further, *Chou* states that its system “may operate in a networked environment using logical connections to one or more remote computers.” EX1004, ¶0056. A POSITA would have been motivated, based on *Chou*’s disclosure that its system can be utilized in a distributed computing environment that has one or more remote computers, to apply *Nobuyoshi*’s teaching of a plurality of reception devices, to *Chou*’s system. EX1006, ¶285.

Moreover, because the AAPA admits that systems with a plurality of reception devices were known and because *Chou* specifically discloses that its system is capable of being used in a system with a plurality of reception devices, *Chou*’s teachings can be used cooperatively with the teachings of *Nobuyoshi* regarding systems with a plurality of reception devices. This provides an expectation of success to a POSITA. Thus, a POSITA would have recognized that the teachings of these references fit neatly with each other to control the coding bit rate of streaming media in a system with multiple reception devices. EX1006, ¶286.

X. NO OBJECTIVE INDICIA OF NON-OBVIOUSNESS

Petitioner is unaware of any secondary considerations of non-obviousness.

XI. CONCLUSION

The Challenged Claims of the '101 Patent are rendered obvious for the reasons set forth above. There is a reasonable likelihood that Petitioner will prevail as to each of these claims. Petitioner accordingly requests *inter partes* review and cancellation of the Challenged Claims.

Respectfully submitted,

Dated: July 27, 2023 /Daniel N. Yannuzzi/

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CLAIM APPENDIX

[1a] 1. A distribution system, including a transmission device and a reception device configured to be capable of communicating with each other,

[1b] the transmission device being equipped with a content transmitting unit for transmitting content data, which is one content coded with any one code rate of a plurality of code rates different from each other, to the reception device, and

[1c] the reception device being equipped with a content reproducing unit for, while receiving the content data transmitted by the transmission device, storing received data of the content data into a storage device and also reproducing the content based on the stored data,

[1d] the distribution system, comprising a code rate determining unit for determining the code rate based on a remaining time before reproduction start time set as time at which the reception device starts reproduction of the content from a present moment and 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, wherein:

[1e] the content transmitting unit is configured to change the code rate of the content data to be transmitted to the reception device to the determined code rate; and

[1f] the content reproducing unit is configured to start reproduction of the content at the set reproduction start time.

2. The distribution system according to claim 1, wherein the code rate determining unit is configured to determine a value becoming smaller as the available reproduction time becomes shorter than a target available reproduction time, which is a target value of the available reproduction time, and becoming smaller as the remaining time becomes shorter, as the code rate.

3. The distribution system according to claim 2, wherein the code rate determining unit is configured to acquire a communication speed, which is a data amount of the content data transmitted from the transmission device to the reception device per unit time, and determine a value of a result of dividing a value of a result of 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, as the code rate.

4. The distribution system according to claim 1, wherein the code rate determining unit is configured to determine the code rate with every change period set in advance.

[5a] 5. The distribution system according to claim 1, further including a plurality of the reception devices,

[5b] the distribution system further comprising a synchronous reproduction controlling unit for matching reproduction positions of the content to be reproduced by the plurality of the reception devices, respectively, with each other among the plurality of the reception devices.

6. The distribution system according to claim 5, further comprising a reproduction start time setting unit for setting the reproduction start time based on a target available reproduction time, which is a target value of the available reproduction time.

7. The distribution system according to claim 5, wherein the content transmitting unit is configured to, when second reproduction start time, which is reproduction start time set for a second reception device as one of the plurality of the reception devices, is later than first reproduction start time, which is reproduction start time set for a first reception device as another one of the plurality of the reception devices, estimate a reproduction position of the content being reproduced by the first reception device at the second reproduction start time and transmit a

portion of the content data at and after the estimated reproduction position to the second reception device.

8. The distribution system according to claim 6, wherein the reproduction start time setting unit is configured to, for each reception device of the plurality of the reception devices, calculate an each-device reproduction preparation time as a time required for the reception device to start reproduction of the content and set the reproduction start time based on a maximum value of the calculated each-device reproduction preparation time.

9. The distribution system according to claim 6, wherein the reproduction start time setting unit is configured to set the reproduction start time based on an activation time, which is a time required for activation of an application program to be executed by the reception device for reproduction of the content, and the target available reproduction time.

10. The distribution system according to claim 6, wherein the reproduction start time setting unit is configured to set the reproduction start time based on a communication speed, which is a data amount of the content data transmitted from

the transmission device to the reception device per unit time, and the target available reproduction time.

[11a] 11. A distribution method applied to a distribution system including a transmission device and a reception device configured to be capable of communicating with each other, the distribution method comprising:

[11b] transmitting content data, which is one content coded with any one code rate of a plurality of code rates different from each other, to the reception device, by the transmission device;

[11c] while receiving the content data transmitted by the transmission device, storing received data of the content data into a storage device and also reproducing the content based on the stored data, by the reception device;

[11d] determining the code rate based on a remaining time before reproduction start time set as time at which the reception device starts reproduction of the content from a present moment, and 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;

[11e] changing the code rate of the content data to be transmitted to the reception device to the determined code rate, by the transmission device; and

[11f] starting reproduction of the content at the set reproduction start time, by the reception device.

[12a] 12. The distribution method according to claim 11, further comprising:

[12b] determining a value becoming smaller as the available reproduction time becomes shorter than a target available reproduction time, which is a target value of the available reproduction time, and becoming smaller as the remaining time becomes shorter, as the code rate.

[13a] 13. The distribution method according to claim 12, further comprising:

[13b] acquiring a communication speed, which is a data amount of the content data transmitted from the transmission device to the reception device per unit time; and

[13c] determining a value of a result of dividing a value of a result of 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, as the code rate.

14. The distribution method according to claim 11, further comprising:

determining the code rate with every change period set in advance.

[15a] 15. The distribution method according to claim 11, applied to the distribution system including a plurality of the reception devices, the distribution method further comprising:

[15c] matching reproduction positions of the content to be reproduced by the plurality of the reception devices, respectively, with each other among the plurality of the reception devices.

[16a] 16. A transmission device configured to be capable of communicating with a reception device, the transmission device comprising:

[16b] a content transmitting unit for transmitting content data, which is one content coded with any one code rate of a plurality of code rates different from each other, to the reception device,

[16c] wherein the content transmitting unit is configured to change the code rate of the content data to be transmitted to the reception device to a code rate determined based on a remaining time before reproduction start time set as time at which the reception device starts reproduction of the content from a present moment and 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.

[17a] 17. The transmission device according to claim 16, further comprising:

[17b] a code rate determining unit means for determining the code rate based on the remaining time and the available reproduction time.

18. The transmission device according to claim 16, wherein the code rate determining unit is configured to determine a value becoming smaller as the available reproduction time becomes shorter than a target available reproduction time, which is a target value of the available reproduction time, and becoming smaller as the remaining time becomes shorter, as the code rate.

19. The transmission device according to claim 18, wherein the code rate determining unit is configured to acquire a communication speed, which is a data amount of the content data transmitted from the transmission device to the reception device per unit time, and determine a value of a result of dividing a value of a result of 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, as the code rate.

20. The transmission device according to claim 16, wherein the code rate determining unit is configured to determine the code rate with every change period set in advance.

[21a] 21. A non-transitory computer-readable storage medium that stores a program comprising instructions for causing a transmission device configured to be capable of communicating with a reception device to realize a content transmitting unit for transmitting content data, which is one content coded with any one code rate of a plurality of code rates different from each other, to the reception device,

[21b] wherein the content transmitting unit is configured to change the code rate of the content data to be transmitted to the reception device to a code rate determined based on a remaining time before reproduction start time set as time at which the reception device starts reproduction of the content from a present moment, and 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.

[22a] 22. A reception device configured to be capable of communicating with a transmission device, the reception device comprising:

[22b] a content reproducing unit for, while receiving content data, which is one content coded with any one code rate of a plurality of code rates different from each other and is transmitted by the transmission device, storing received data of the content data into a storage device and also reproducing the content based on the stored data; and

[22c] a code rate determining unit for determining the code rate based on a remaining time before reproduction start time set as time to start reproduction of the content from a present moment and 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,

[22d] wherein the content reproducing unit is configured to receive content data coded with the determined code rate and start reproduction of the content at the set reproduction start time.

23. The reception device according to claim 22, wherein the code rate determining unit is configured to determine a value becoming smaller as the available reproduction time becomes shorter than a target available reproduction time, which is a target value of the available reproduction time, and becoming smaller as the remaining time becomes shorter, as the code rate.

24. The reception device according to claim 23, wherein the code rate determining unit is configured to acquire a communication speed, which is a data amount of the content data transmitted from the transmission device to the reception device per unit time, and determine a value of a result of dividing a value of a result of 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, as the code rate.

25. The reception device according to claim 22, wherein the code rate determining unit is configured to determine the code rate with every change period set in advance.

[26a] 26. A non-transitory computer-readable storage medium that stores a program comprising instructions for causing a reception device configured to be capable of communicating with a transmission device to realize:

[26b] a content reproducing unit for, while receiving content data, which is one content coded with any one code rate of a plurality of code rates different from each other and is transmitted by the transmission device, storing received data of the content data into a storage device and also reproducing the content based on the stored data; and

[26c] a code rate determining unit for determining the code rate based on a remaining time before reproduction start time set as time at which the reception device starts reproduction of the content from a present moment, and 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,

[26d] wherein the content reproducing unit is configured to receive content data coded with the determined code rate and start reproduction of the content at the set reproduction start time.

[27a] 27. A distribution system, including a transmission device and a reception device configured to be capable of communicating with each other,

[27b] the transmission device being equipped with a content transmitting means for transmitting content data, which is one content coded with any one code rate of a plurality of code rates different from each other, to the reception device, and

[27c] the reception device being equipped with a content reproducing means for, while receiving the content data transmitted by the transmission device, storing received data of the content data into a storage device and also reproducing the content based on the stored data,

[27d] the distribution system, comprising a code rate determining means for determining the code rate based on a remaining time before reproduction start time set as time at which the reception device starts reproduction of the content from a present moment and 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, wherein:

[27e] the content transmitting means is configured to change the code rate of the content data to be transmitted to the reception device to the determined code rate; and

[27f] the content reproducing means is configured to start reproduction of the content at the set reproduction start time.

[28a] 28. A transmission device configured to be capable of communicating with a reception device, the transmission device comprising:

[28b] a content transmitting means for transmitting content data, which is one content coded with any one code rate of a plurality of code rates different from each other, to the reception device,

[28c] wherein the content transmitting means is configured to change the code rate of the content data to be transmitted to the reception device to a code rate determined based on a remaining time before reproduction start time set as time at

which the reception device starts reproduction of the content from a present moment and 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.

[29a] 29. A reception device configured to be capable of communicating with a transmission device, the reception device comprising:

[29b] a content reproducing means for, while receiving content data, which is one content coded with any one code rate of a plurality of code rates different from each other and is transmitted by the transmission device, storing received data of the content data into a storage device and also reproducing the content based on the stored data; and

[29c] a code rate determining means for determining the code rate based on a remaining time before reproduction start time set as time to start reproduction of the content from a present moment and 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,

[29d] wherein the content reproducing means is configured to receive content data coded with the determined code rate and start reproduction of the content at the set reproduction start time.

CERTIFICATE OF WORD COUNT

Pursuant to 37 C.F.R. §42.24(d), Petitioners certify that this petition includes 13,991 words, as measured by Microsoft Word, exclusive of the table of contents, table of authorities, mandatory notices under §42.8, certificates of service, word count, or appendix of exhibits.

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CERTIFICATE OF SERVICE

The undersigned hereby certifies that a true and correct copy of the foregoing Petition for *Inter Partes* Review of U.S. Patent No. 8,752,101 and Exhibits 1001-1037 were served in their entirety on July 27, 2023, on the Patent Owner at the following addresses of record as listed on PAIR via overnight Federal Express:

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