

Patent Owner NEC Corporation's Demonstrative Exhibits

Peloton Interactive, Inc. v. NEC Corporation

Case No. IPR2023-01239 (U.S. Pat. No. 8,752,101)

November 22, 2024



Table of Contents

01

Introduction and Background

02

Claim Construction

03

Overview of the Prior Art

04

Chou Does Not Disclose Limitation 1[d]

4.1 – “available time”

4.2 – “remaining time”

05

Grounds 2 and 3

06

Dr. Reader's Opinions are Unreliable

07

Peloton’s sur-sur-reply Arguments are Untimely

1

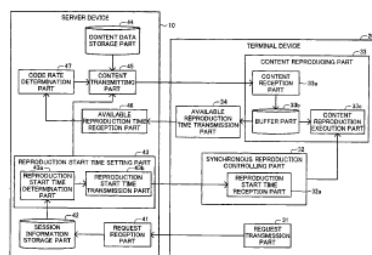
INTRODUCTION AND BACKGROUND

Overview of 101 Patent, Grounds

EX1001 ('101 Patent); Claim 1



(54) DISTRIBUTION SYSTEM	(56)	References Cited
(75) Inventor: Takeo Onishi , Tokyo (JP)	U.S. PATENT DOCUMENTS	
(73) Assignee: NEC Corporation , Tokyo (JP)		5,185,736 B1 * 2/2001 Uno 725/95 6,370,688 B1 * 4/2002 Hozjia, Jr. 725/101
(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 62 days.		2003/0225902 A1 * 12/2003 Mori 725/95 2006/0106852 A1 * 7/2006 Honda et al. 725/95 2007/0076754 A1 * 4/2007 Krishnasamy 370/468
(21) Appl. No.: 13/508,025	FOREIGN PATENT DOCUMENTS	
(22) PCT Filed: Oct. 13, 2010	JP 2005-419786 A 7/2005 2007-013705 A 1/2007	
(86) PCT No.: PCT/JP2010/006607	OTHER PUBLICATIONS	
§ 371 (c)(1), (2), (4) Date: May 3, 2012	International Search Report in PCT/JP2010/006607 dated Nov. 9, 2010 (English Translation) (Continued)	
(87) PCT Pub. No.: WO2011/065490		
PCT Pub. Date: May 12, 2011	<i>Primary Examiner</i> — Jason Salce (74) Attorney, Agent, or Firm — McGinn IP Law Group, PLLC	
(65) Priority Publication Data	(57) ABSTRACT	
US 2012/027079 A1 Sep. 6, 2012	A distribution system 100 includes a transmission device 110 and a reception device 120 . The transmission device transmits content data coded with a certain code rate to the reception device. The reception device, while receiving the content data transmitted by the transmission device, stores received data into a storage device and also reproduces content based on the stored data. The distribution system determines a code rate based on a remaining time after reproduction start time from a present moment to a available reproduction time, which is a time available for reproduction of the content based on the stored data. The transmission device changes the code rate of the content data to be transmitted to the determined code rate. The reception device starts reproduction of the content at the reproduction start point.	
(30) Foreign Application Priority Data		
Nov. 5, 2009 (JP) 2009-235581		
(51) Int. Cl. H04N 7/73 (2011.01)		
(52) U.S. Cl. USPC 725/90, 725/91, 725/92, 725/93, 725/95, 725/96, 725/97, 370/229, 370/230, 370/231, 370/232, 370/233, 370/234, 370/235, 370/236, 370/237, 370/238, 370/239, 370/241, 370/242, 370/243, 370/244, 370/245, 370/246, 370/247, 370/248, 370/249, 370/250, 370/251, 370/252, 370/253, 370/254, 370/255, 370/256, 370/257, 370/258, 370/259, 370/260, 370/261, 370/262, 370/263, 370/264, 370/265, 370/266, 370/267, 370/268, 370/269, 370/270, 370/271, 370/272, 370/273, 370/274, 370/275, 370/276, 370/277, 370/278, 370/279, 370/280, 370/281, 370/282, 370/283, 370/284, 370/285, 370/286, 370/287, 370/288, 370/289, 370/290, 370/291, 370/292, 370/293, 370/294, 370/295, 370/296, 370/297, 370/298, 370/299, 370/300, 370/301, 370/302, 370/303, 370/304, 370/305, 370/306, 370/307, 370/308, 370/309, 370/310, 370/311, 370/312, 370/313, 370/314, 370/315, 370/316, 370/317, 370/318, 370/319, 370/320, 370/321, 370/322, 370/323, 370/324, 370/325, 370/326, 370/327, 370/328, 370/329, 370/330, 370/331, 370/332, 370/333, 370/334, 370/335, 370/336, 370/337, 370/338, 370/339, 370/340, 370/341, 370/342, 370/343, 370/344, 370/345, 370/346, 370/347, 370/348, 370/349, 370/350, 370/351, 370/352, 370/353, 370/354, 370/355, 370/356, 370/357, 370/358, 370/359, 370/360, 370/361, 370/362, 370/363, 370/364, 370/365, 370/366, 370/367, 370/368, 370/369, 370/370, 370/371, 370/372, 370/373, 370/374, 370/375, 370/376, 370/377, 370/378, 370/379, 370/380, 370/381, 370/382, 370/383, 370/384, 370/385, 370/386, 370/387, 370/388, 370/389, 370/390, 370/391, 370/392, 370/393, 370/394, 370/395, 370/396, 370/397, 370/398, 370/399, 370/400, 370/401, 370/402, 370/403, 370/404, 370/405, 370/406, 370/407, 370/408, 370/409, 370/410, 370/411, 370/412, 370/413, 370/414, 370/415, 370/416, 370/417, 370/418, 370/419, 370/420, 370/421, 370/422, 370/423, 370/424, 370/425, 370/426, 370/427, 370/428, 370/429, 370/430, 370/431, 370/432, 370/433, 370/434, 370/435, 370/436, 370/437, 370/438, 370/439, 370/440, 370/441, 370/442, 370/443, 370/444, 370/445, 370/446, 370/447, 370/448, 37		



29 Claims, 14 Drawing Sheets

(10) **Patent No.:** **US 8,752,101 B2**
(45) **Date of Patent:** **Jun. 10, 2014**

(56) **References Cited**

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2006/0168632	A1 *	7/2006	Honda et al.	725/95
2007/0076754	A1 *	4/2007	Krishnaswamy	370/468

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 62 days.

the content reproducing unit is configured to start reproduction of the content at the set reproduction start time.

'101 Patent

Bibliographic Information

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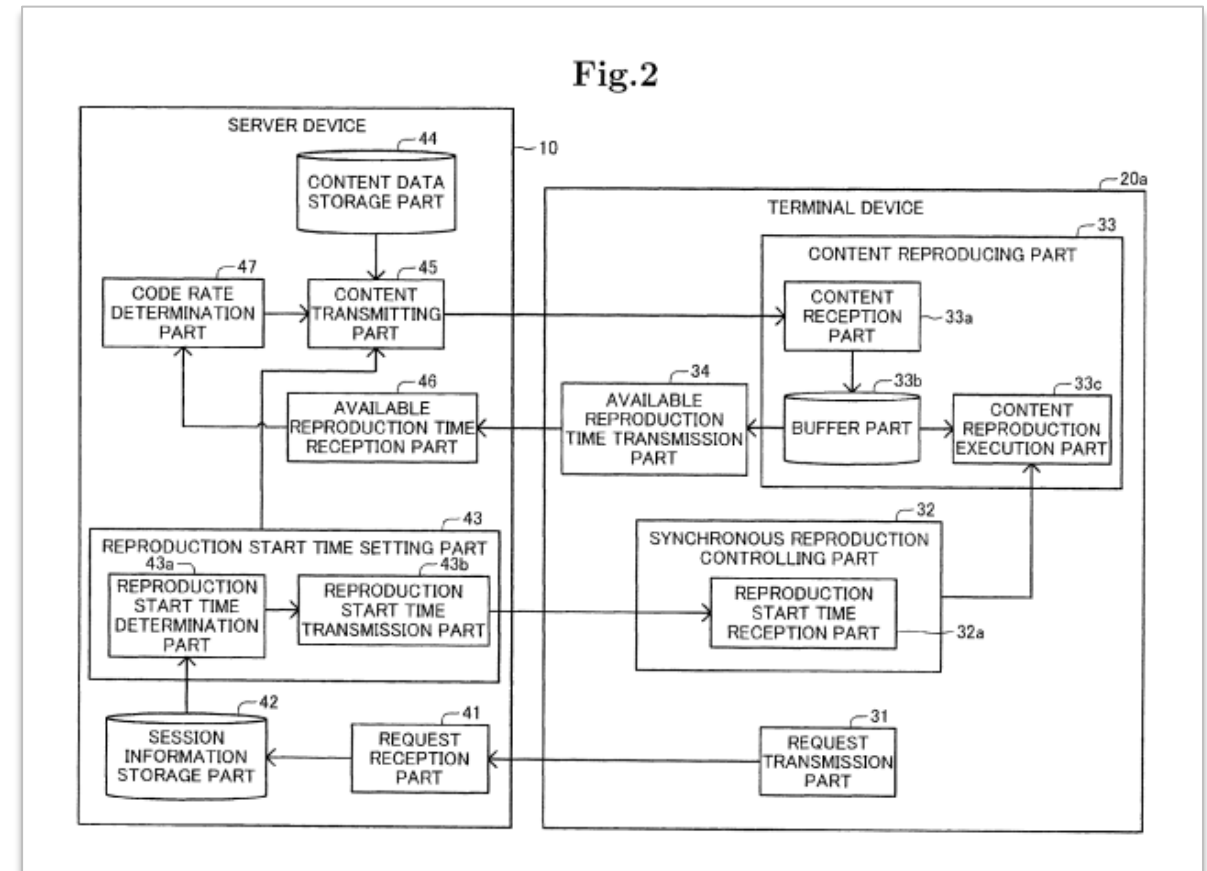
Takeo Onishi

Title

"Distribution system"

Specification

The '101 Patent provides a distribution system that determines the code rate using a remaining time before reproduction start time, which is set as a time at which the reception device starts reproduction of the content from a present moment, and an available reproduction time, which is a time available for reproduction of the content based on the stored data.



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>

ID not persuaded by Petition that motivation to combine

Not Addressed in Reply

Dependent claims only; fails for same reasons as Ground 1

2

CLAIM CONSTRUCTION

BAKER BOTTS



2.1

**“DETERMINING THE CODE RATE BASED ON...” MEANS THAT THE
“AVAILABLE TIME” AND “REMAINING TIME” MUST BE USED AS AN INPUT**

The claim language requires that both time variables – “available time” and “remaining time” must be used as an input (directly or indirectly)

US 8,752,101 B2

23 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. In this case, it is preferred that the code rate determining means 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.

In this case, it is preferred that the code rate determining means 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.

In this case, it is preferred that the code rate determining means is configured to determine the code rate with every change period set in advance.

A program of another exemplary embodiment of the present invention comprises instructions for causing a reception device configured to be capable of communicating with a transmission device to realize:

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

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.

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.

Inventions of a distribution method, a transmission device, a program and a reception device having the aforementioned configurations have the same actions as the distribution system described above, and therefore, can achieve the object of the present invention mentioned above.

Although the present invention has been described with reference to the exemplary embodiments, the present invention is not limited to the exemplary embodiments. The configuration and details of the present invention can be altered in various manners that can be understood by those skilled in the art within the scope of the present invention.

Further, the program is stored in the storage device in the respective exemplary embodiments, but may be stored in a computer-readable storage medium. For example, the recording medium is a portable medium such as a flexible disk, an optical disk, a magneto-optical disk and a semiconductor memory.

Further, as modified examples of the exemplary embodiments, any combination of the exemplary embodiments and modified examples may be employed.

The present invention is based upon and claims the benefit of priority from Japanese patent application No. 2009-253581, filed on Nov. 5, 2009, the disclosure of which is incorporated herein in its entirety by reference.

24 Industrial Applicability

The present invention can be applied to, for example, a dim distribution system that transmits content data representing content from a transmission device to a reception device.

DESCRIPTION OF REFERENCE NUMERALS

1 distribution system
10 server device
20a, 20b, 20c terminal device
31 request transmission part
32 synchronous reproduction controlling part
32a reproduction start time reception part
33 content reproducing part
33a content reception part
33b buffer part
33c content reproduction execution part
34 available reproduction time transmission part
41 request reception part
42 session information storage part
43 reproduction start time setting part
43a reproduction start time determination part
44 content data storage part
45 content transmitting part
46 available reproduction time reception part
47 code rate determining part
100 distribution system
110 transmission device
111 content transmitting part
120 reception device
121 content reproducing part
131 code rate determining part
NW communication line

The invention claimed is:

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

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

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,

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:

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

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,

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:



Masimo Corp. v. Sotera Wireless, Inc., No. 2022-1415, 2023 WL 6307959 (Fed. Cir. Sept. 28, 2023)

The Federal Circuit affirmed the Board’s understanding of “based on,” in the context of those claims, meant that the alarm condition must first be present for the alarm to be “based on” the condition. See also id., *3 n.1 (“[t]he Board cited to a dictionary definition of ‘base on’ ... noting it defines ‘the verb ‘base on’ to mean ‘to use particular ... facts to make a decision [or] do a calculation.’”).

EX1001 (101 Patent), Cl. 1

The specification confirms that both time variables — “available time” and “remaining time” — must be used as an input



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For example, after the detailed discussion of equation (5), the '101 Patent states, “[t]hat is to say, the content transmitting part 45 changes the code rate of the content data to be transmitted to the terminal device having transmitted the available reproduction time information, to the code rate determined based on the available reproduction time information.” Id., 10:65-11:3.

EX2012, §V.A.1

9 US 8,752,101 B2 10

elapses after reception of the session start request, the content transmitting part 45 starts transmission of the content data with the head position.

On the other hand, in the case of transmitting the content data based on the session participation request received after a lapse of the standby time from reception of the session start request, the content transmitting part 45 determines whether a determination condition is satisfied or not. Herein, the determination condition is a condition that reproduction start time determined by the reproduction start time setting part 43 based on the session participation request (second reproduction start time) is later time than reproduction start time determined by the reproduction start time setting part 43 based on another session participation request including the same session ID as the session participation request (first reproduction start time).

In a case that the second reproduction start time is time before the first reproduction start time, the content transmitting part 45 starts transmission of the content data from the head position.

On the other hand, in a case that the second reproduction start time is time after the first reproduction start time, the content transmitting part 45 determines a position behind the head position by a difference between the first reproduction start time and the second reproduction start time, as a transmission start position. The transmission start position is in content data, which is a position to start transmission of the content data. Then, the content transmitting part 45 starts transmission of the content data from the determined transmission start position.

That is to say, in a case that reproduction start time set for a second terminal device (second reproduction start time) is later time than reproduction start time set for a first terminal device (first start reproduction start time), the content transmitting part 45 estimates a content reproduction position (i.e., a transmission start position) that the first terminal device is reproducing at the second reproduction start time. Then, the

maton, which includes the acquired available reproduction time, the own terminal ID (the terminal ID) and the session ID, to the server device 10.

The available reproduction time reception part 46 of the server device 10 receives available reproduction time information from the respective terminal devices 20a to 20c.

When the available reproduction time information is received by the available reproduction time reception part 46, the code rate determining part 47 of the server device 10 acquires the reproduction start time included in the session information including the terminal ID and session ID included in the available reproduction time information.

The code rate determining part 47 determines a code rate for the terminal device having transmitted the available reproduction time information, based on a remaining time before the acquired (i.e., set) reproduction start time from the present moment and the available reproduction time included in the available reproduction time information.

To be specific, the code rate determining part 47 determines, as the code rate, a value that becomes smaller as the available reproduction time becomes shorter than the target available reproduction time and that becomes smaller as the remaining time becomes shorter.

In this exemplary embodiment, the code rate determining part 47 calculates (acquires) a communication speed B_n during a period between the present moment and a moment that is the change period before (past), based on an equation (4) shown below, wherein n denotes an integer and represents the number of times of reception of the available reproduction time information from the terminal device.

$$B_n = (T_d - T_n) / (t_s - t_n) \quad (4)$$

In the equation, t_s denotes time of reception of the available reproduction time information at time (i.e., time at the present moment), and t_n denotes time of reception of the available reproduction time information last time (i.e., time at a moment that is the change period before). Moreover, T_d denotes the available reproduction time received this time (i.e., time at the present moment), and T_n denotes the available

data stored by the buffer part 33a.

That is to say, the content reproducing part 33, 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).

In the case of accepting a reproduction start instruction outputted by the synchronous reproduction controlling part 32 (i.e., at set reproduction start time), the content reproduction execution part 33c starts reproduction of content.

The available reproduction time transmission part 34 of the terminal device 20a acquires an available reproduction time, which is a time that the content reproduction execution part 33c can reproduce the content based on the content data stored by the buffer part 33a, every time an acquisition period (a change period) set in advance elapses. Upon acquisition of the available reproduction time, the available reproduction time transmission part 34 transmits available reproduction time information that is the change period after). That is to say, the code rate determining part 47 determines the code rate r_{n+1} based on an equation (5) shown below.

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

That is to say, the code rate determining part 47 determines, as the code rate r_{n+1} , a result of dividing a result of multiplying the acquired communication speed B_n and a remaining time $t_s - t_n$ by a result of $T_d - T_n$ of subtracting the available reproduction time T_n from the target available reproduction time T_d .

When the code rate r_{n+1} is determined by the code rate determining part 47, the content transmitting part 45 changes content data to be transmitted to the terminal device having transmitted the available reproduction time information having been the basis of determination of the code rate to content data coded with the code rate r_{n+1} . That is to say, the content transmitting part 45 changes the code rate of the content data to be transmitted to the terminal device having transmitted the

“remaining time”

“available time”

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

data coded with the code rate r_{n+1} . That is to say, the content transmitting part 45 changes the code rate of the content data to be transmitted to the terminal device having transmitted the available reproduction time information, to the code rate determined based on the available reproduction time information.

EX1001, 10:65-11:3

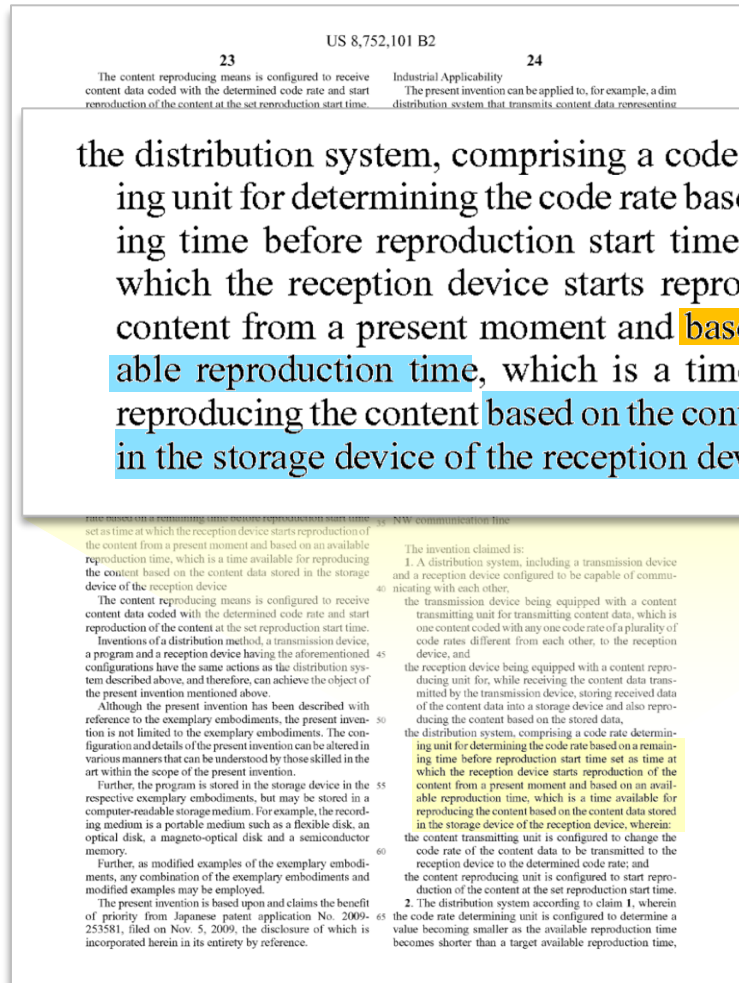
The claim language requires that “available time” is based on “content data stored in the storage device”



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56. The Institution Decision states that “we find no requirement to examine buffer duration recited by claim 1, only to determine the code rate based on available reproduction time.” ID, 41. In my opinion, this conclusion is based on an incomplete reading of the claims. For example, Claim 1 recites determining the code rate based on *inter alia* the “available reproduction time,” which the claims expressly state is “a time available for reproducing the content based on the content data stored in the storage device of the reception device.” EX1001, Claim 1. Accordingly, a POSITA would understand the “available reproduction time” to be an amount of time, corresponding to the time it would take for the stored content to be played up until the moment that playback ends.

EX2012 (Cooperstock Decl.) at ¶56



EX1001 (101 Patent), Cl. 1

Paper 21 (POR) at 12-17; Paper 28 (Sur-Reply) at 1-2, 3-5

The specification confirms that “available time” must be used as an input



DR. JEREMY COOPERSTOCK

57. “Moreover, in my opinion, a POSITA would understand that if an available reproduction time is not examined, acquired, or determined, then no determination could be made based on the available time. That is, a POSITA reading the ‘101 Patent and Claim 1 would understand determining the code rate for subsequent content data to be transmitted requires using a value of the available time as an input to the determination of the code rate, which necessitates that the available reproduction time must first exist in a tangible form usable by the system (e.g., via determining, acquiring, examining, etc.). EX1001, 9:60-10:18; 10:65-11:3; Claim 1. Particularly, Claim 1 requires the available time to be “based on content data stored in the storage device of the reception device,” which a POSITA would understand to mean that the system looks to (i.e., examines) the content data that is stored at (or near) the time of determining the code rate to obtain, determine, and/or acquire the available time. EX1001, 9:60-10:18; 10:65-11:3; Claim 1.”

US 2012/0227079 A1 Sep. 6, 2012

(12) **United States Patent**
Onishi

(10) **Patent No.:** US 8,752,101 B2
(45) **Date of Patent:** Jun. 10, 2014

The available reproduction time transmission part 34 of the terminal device 20a acquires an available reproduction time, which is a time that the content reproduction execution part 33c can reproduce the content based on the content data stored by the buffer part 33b, every time an acquisition period (a change period) set in advance elapses.

US 2012/0227079 A1 Sep. 6, 2012

(30) **Foreign Application Priority Data**
Nov. 5, 2009 (JP) 2009-253581

(51) **Int. Cl.**
H04N 7/173 (2011.01)

(52) **U.S. Cl.**
USPC 725/90; 725/91; 725/92; 725/93; 725/94; 725/95; 725/96; 725/97; 370/229; 370/230; 370/231; 370/232; 370/233; 370/234;

(57) **ABSTRACT**
A distribution system 100 includes a transmission device 110 and a reception device 120. The transmission device transmits content data coded with a certain code rate to the reception device. The reception device, while receiving the content data transmitted by the transmission device, stores received data into a storage device and also reproduces content based on the stored data. The distribution system determines a code rate based on a remaining time before reproduction start time from a present moment and an available reproduction time, which is a time available for reproduction of the content based

The code rate determining part 47 determines a code rate for the terminal device having transmitted the available reproduction time information, based on a remaining time before the acquired (i.e., set) reproduction start time from the present moment and the available reproduction time included in the available reproduction time information.

FIG. 1

FIG. 2

EX1001 (101 Patent), at 9:60-65; at 10:13-18

EX2012 (Cooperstock Decl.) at 157

Claims 2 & 3 confirm that “available reproduction time” represents an actual value (in time) and that this value is used as an input to determine code rate



DR. JEREMY COOPERSTOCK



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.

US 2012/0222279 A1 Sep. 10, 2012 (57)
(30) Foreign Application Priority Data
Nov. 5, 2009 (JP) 2009-253581
(51) Int. Cl.
A distribution system 100 includes a transmission device 110 and a reception device 120. The transmission device transmits content data coded with a certain code rate to the reception device. The reception device, while receiving the content data transmitted by the transmission device, stores received data.

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.

58. In my opinion, Claim 3 further confirms that the “available reproduction time” is a value of time. Claim 3 states, in part, “multiplying the acquired communication speed and the remaining time by a value of a result of subtracting the available reproduction time from the target available reproduction time,” as further described in Equations 4 and 5, which demonstrates that the available reproduction time is a value representative of the actual time available for reproduction and is used as an input into the determination of the code rate. EX1001, Claim 3, 10:24-59. As another example, Claim 2 describes the comparison of the “available reproduction time” by describing that the system “determine[s] a value becoming smaller as the available reproduction time becomes shorter than a target available reproduction time ... as the code rate.” EX1001, Claim 2. A POSITA reading this would understand that the “available reproduction time” is an actual value of time available for reproduction that may “become shorter” than its “target” time.

EX1001 (101 Patent), Cl. 2; EX1001 (101 Patent), Cl. 3

EX2012 (Cooperstock Decl.) at ¶158

Petitioner's Sur-Sur-Reply



NEC admits that its argument that Chou fails to disclose Limitation 1(d) hinges on construing “‘based on’ to mean ‘*using as an input.*’” Sur-reply (SR) 2, 5.



NEC never admitted that construction of “based on” is dispositive.



Under any construction, Chou still fails to disclose limitation 1(d)

Moreover, even adopting Petitioner's apparent claim construction position, Chou fails to disclose limitation 1[d] because Chou never discloses that the “factor[s]” (*i.e.*, the available time or the remaining time) are used to “impact or influence” the determination of the code rate, as evidenced by Chou's failure to disclose that the factors are ever determined (much less used) for the determination of the code rate. *See* EX2012, §§ V.B.2-4.

3

OVERVIEW OF THE PRIOR ART

Chou (U.S. Pat. Pub. No. 2006/0143678 A1)

Chou describes using a theory of optimal linear quadratic control in choosing the bit rate of transmitted data between a server and a client.

(19) **United States**
(12) **Patent Application Publication**
Chou et al.

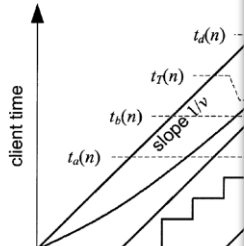
(54) **SYSTEM AND PROCESS FOR CONTROLLING THE CODING BIT RATE OF STREAMING MEDIA DATA EMPLOYING A LINEAR QUADRATIC CONTROL TECHNIQUE AND LEAKY BUCKET MODEL**

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(21) Appl. No.: 11/010,114
(22) Filed: Dec. 10, 2004



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(19) **United States**
(12) **Patent Application Publication**
Chou et al.

(10) Pub. No.: **US 2006/0143678 A1**
(43) Pub. Date: **Jun. 29, 2006**

(54) **SYSTEM AND PROCESS FOR CONTROLLING THE CODING BIT RATE OF STREAMING MEDIA DATA EMPLOYING A LINEAR QUADRATIC CONTROL TECHNIQUE AND LEAKY BUCKET MODEL**

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(21) Appl. No.: 11/010,114
(22) Filed: Dec. 10, 2004

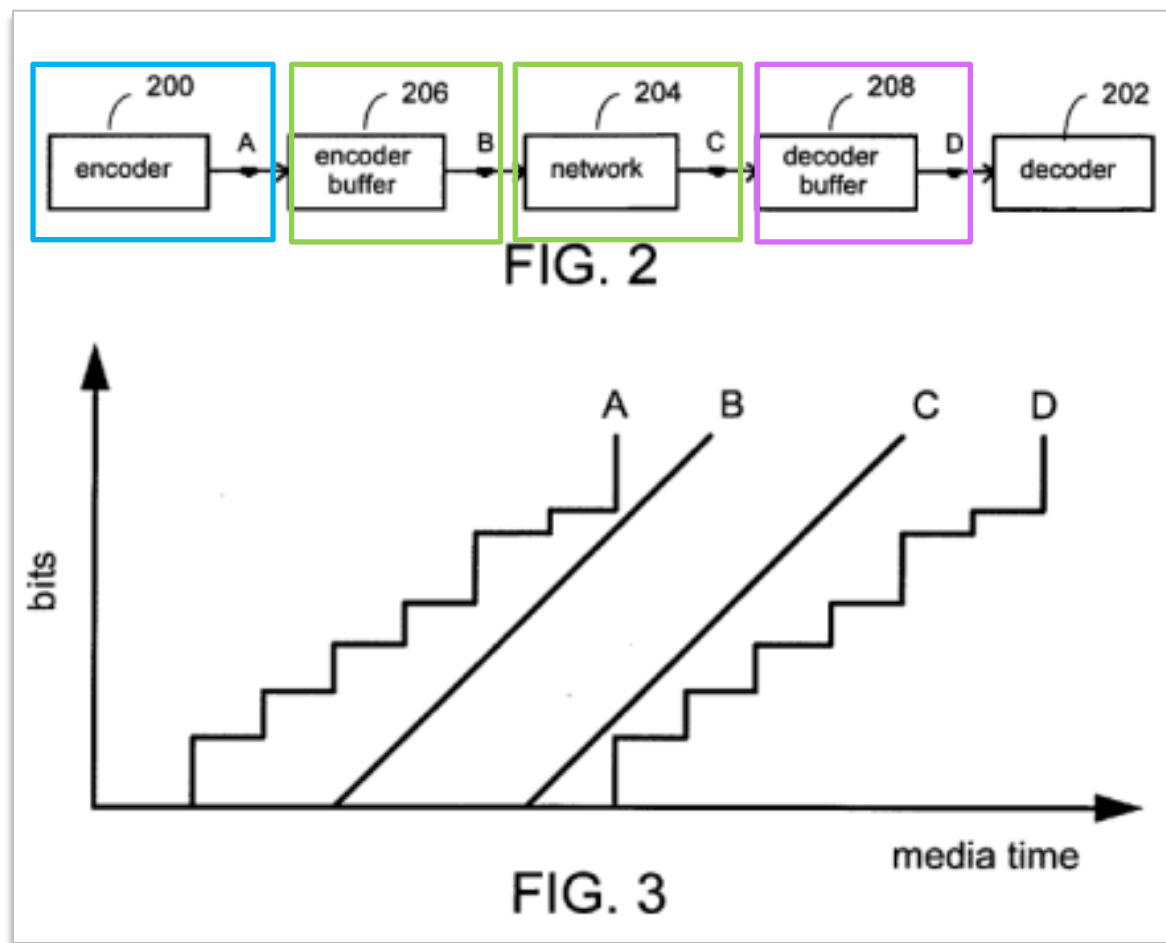
Publication Classification

(51) Int. Cl. **H04N 7/173** (2006.01)
(52) U.S. Cl. **725/118**

(57) **ABSTRACT**

A system and process for controlling the coding bit rate of streaming media data is presented. This coding bit rate control involves dynamically adjusting the coding bit rate to control client buffer duration to prevent the buffer from underflowing, while keeping the average coding bit rate close to the average transmission bit rate of the network (and thus maximizing the quality of the data playback). 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. In addition, a leaky bucket model is incorporated into the control loop so that the changes in buffer duration due to natural variation in the instantaneous coding bit rate are not mistaken for changes in buffer duration due to network congestion.

Chou discloses that the “leaky bucket model” can be visualized by imagining a scenario where the encoder and the decoder run in real time over a network

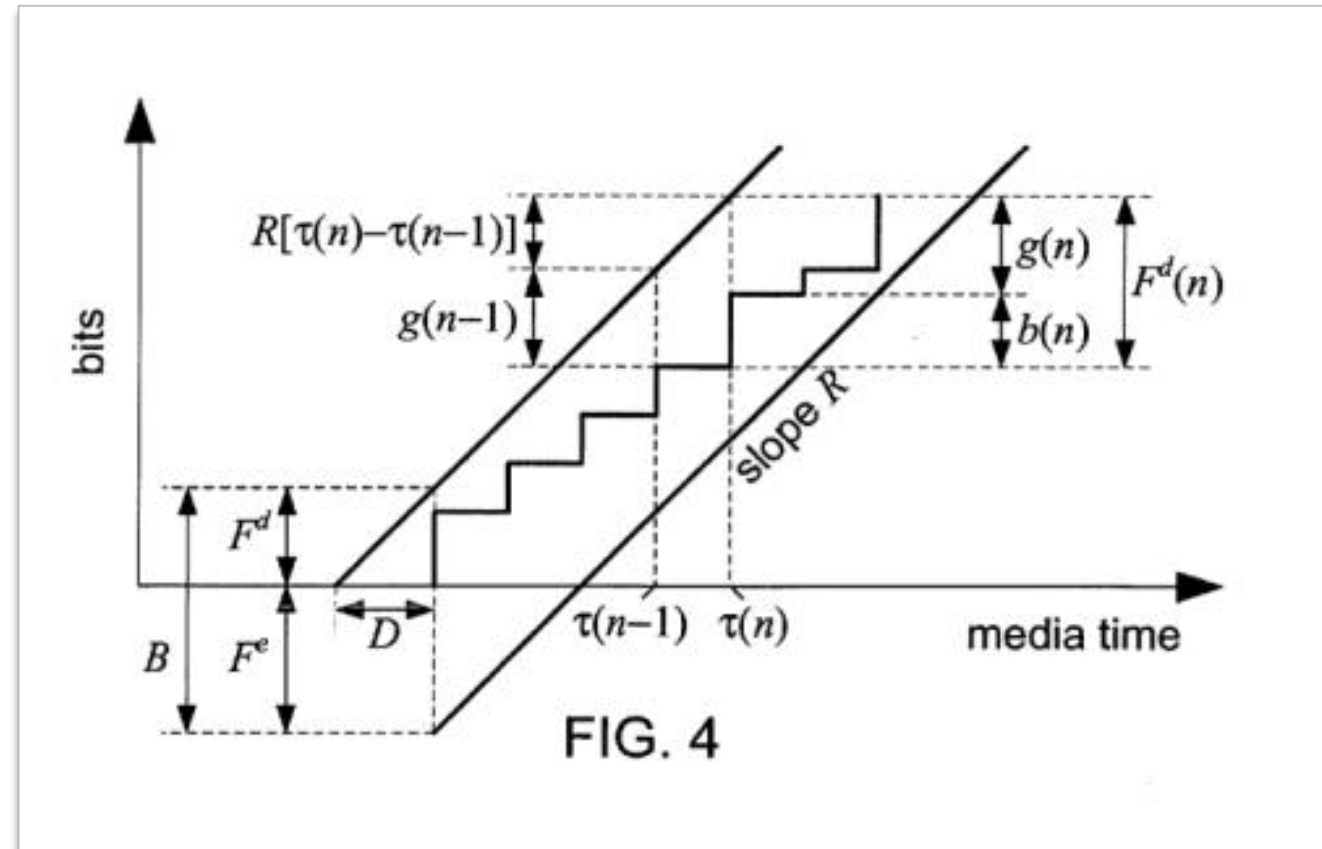
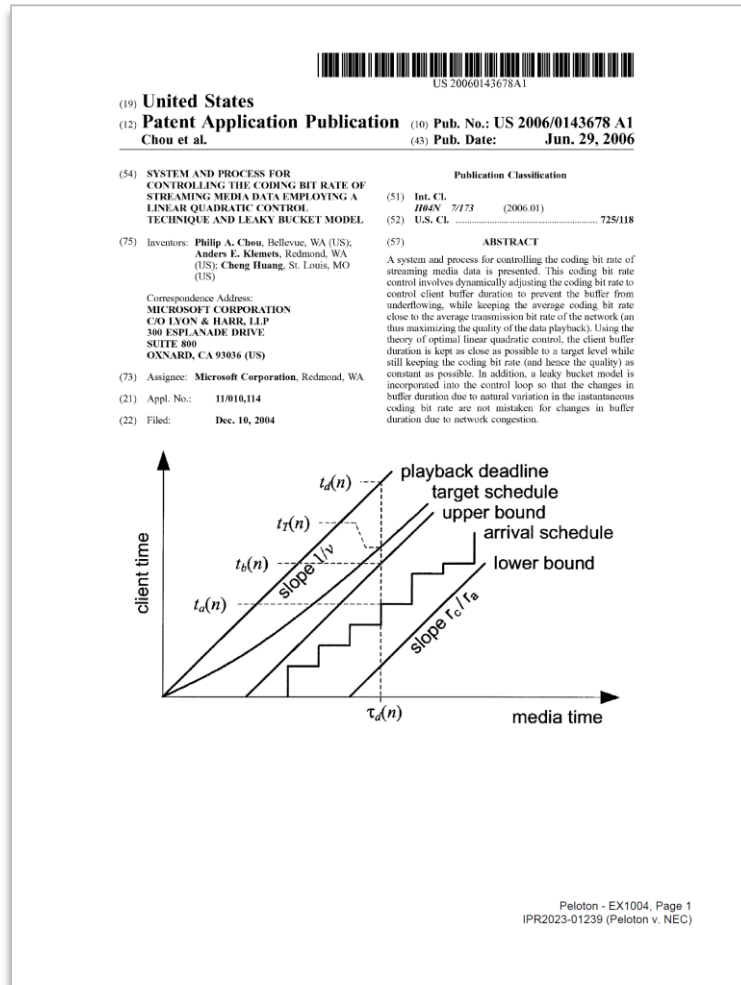


Schedule A is the schedule at which captured frames are encoded and placed into the encoder buffer 206 with each “step” representing frame having the number of bits that correspond to that frame

Schedules B and C are the “schedules at which bits respectively enter and leave the communication channel,” which is to say Schedule B represents when each bit leaves the encoder buffer 206 and Schedule C represents when each bit is received by the decoder buffer

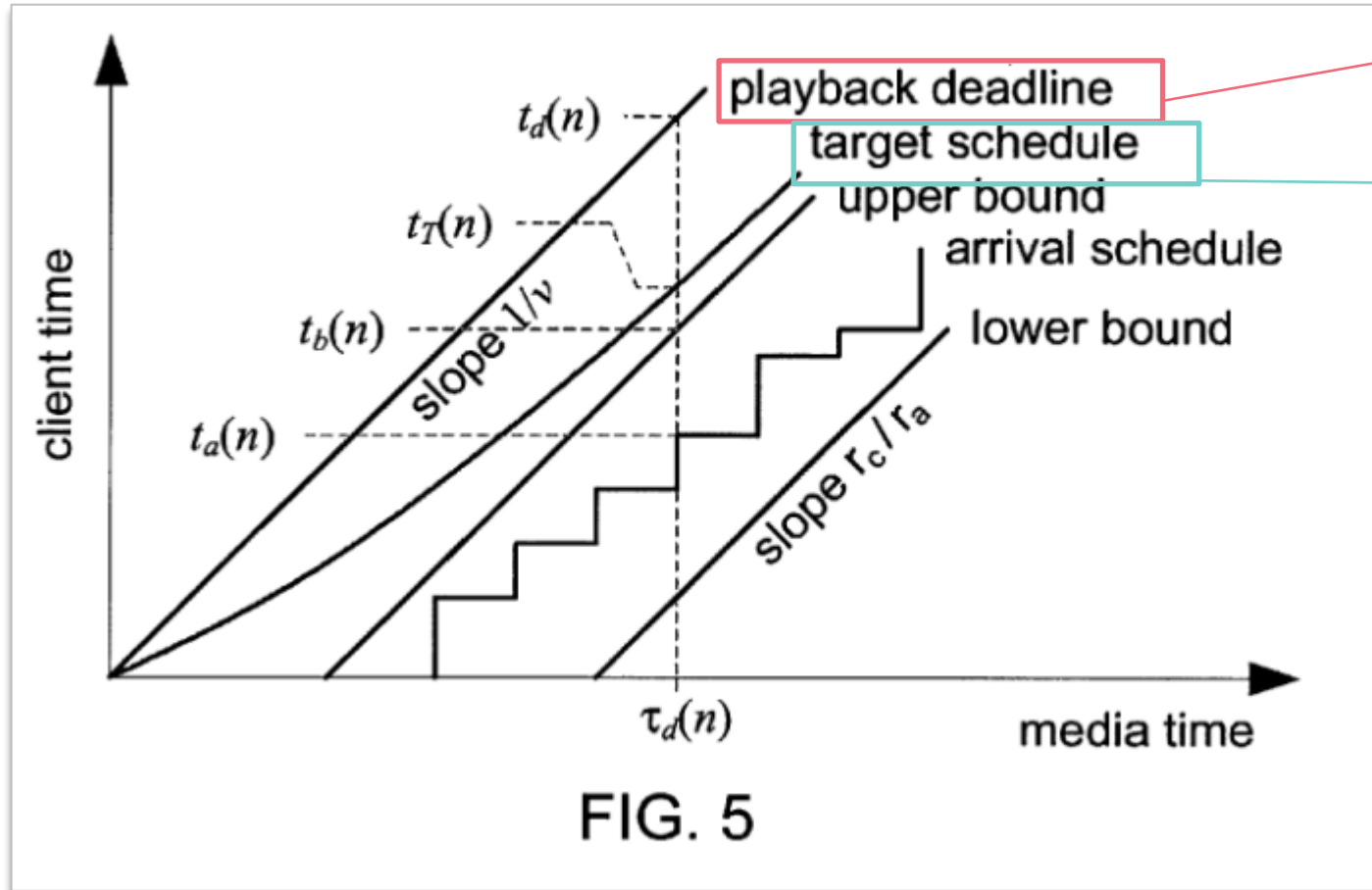
Schedule D is the “schedule at which frames are removed from decoder buffer” and decoded for presentation.

Because Chou utilizes both an encoder buffer and a decoder buffer, Schedules B and C are disclosed to be the “buffer tube” that is said to bound both buffer schedules



EX1004 (Chou), Fig. 4

Chou then extrapolates this model by dividing the y-axis, which was “bits” by “ r_a ” which is the rate “that bits arrive at the client,” to derive Figure 5



the time “ $t_d(n)$ ” at which frame “n” is scheduled to be played

an idealized schedule of time “ $t_T(n)$ ” at which frame “n” would ideally arrive

The idealized schedule of time “ $t_T(n)$ ” is different from the actual time “ $t_a(n)$ ” of arrival of frame “n.”

EX1004 (Chou), Fig. 5

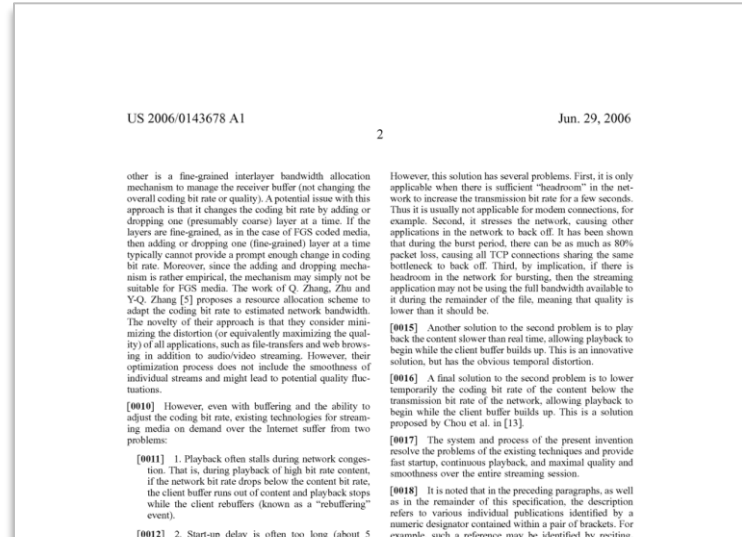
Chou discloses that controlling the “buffer tube upper bound” is done via use of equation (18) to approximate “ $t_b(n)$ ” to “ $t_T(n)$ ” by solving for “the coding bit rate $r_c(n)$.”

Chou discloses determining the bit rate based on an estimation between an “upper bound” that is defined by the constraints of the encoder buffer and an idealized “target schedule.”

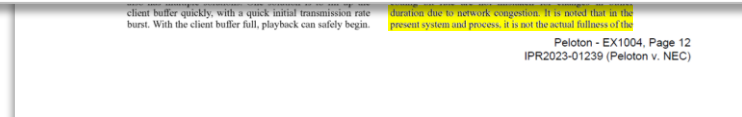
$$t_b(n) = t_b(n - 1) + \frac{r_c(n)}{f(n)\tilde{r}_a(n)} + w(n - 1), \text{ where}$$

EX1004 (Chou), Eq. 18

duration due to network congestion. It is noted that in the present system and process, it is **not** the actual fullness of the client buffer that is controlled, but **an upper bound** on the time of arrival of bits into the client buffer, to a target level. The upper bound is based on the leaky bucket model of the coding bit rate.



client buffer quickly, with a quick initial transmission rate burst. With the client buffer full, playback can safely begin.



EX1004 (Chou), ¶19

Wang (U.S. Pat. No. 5,867, 230) [EX1016]

Wang is directed to embodiments deploying real-time transport protocol (RTP).

United States Patent

Wang et al.

[54] SYSTEM, DEVICE, AND METHOD FOR STREAMING A MULTIMEDIA FILE ENCODED AT A VARIABLE BITRATE

[75] Inventors: Feng Chi Wang, Newton; Thomas Goetz, Attleboro; Krystyna Wieckiewicz, Plainville, all of Mass.

[73] Assignee: Motorola Inc., Schaumburg, Ill.

[21] Appl. No.: 885,271

[22] Filed: Jun. 30, 1997

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 711,701, Sep. 6, 1996.

[51] Int. Cl.² H04N 7/26; H04N 7/52; H04N 7/56; H04N 7/62

[52] U.S. Cl. 348/845; 348/423

[58] Field of Search 348/845, 845.2, 348/845.3, 423, 12, 13; H04N 7/26, 7/52, 7/56, 7/62

[56] References Cited

U.S. PATENT DOCUMENTS

5,481,312 1/1996 Cash 348/845.2

08

PACKET

TIME

PACKET LENGTH

SEND

United States Patent

Wang et al.

[11] Patent Number: 5,867,230

[45] Date of Patent: Feb. 2, 1999

[54] SYSTEM, DEVICE, AND METHOD FOR STREAMING A MULTIMEDIA FILE ENCODED AT A VARIABLE BITRATE

[75] Inventors: Feng Chi Wang, Newton; Thomas Goetz, Attleboro; Krystyna Wieckiewicz, Plainville, all of Mass.

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[52] U.S. Cl. 348/845; 348/423

[58] Field of Search 348/845, 845.2, 348/845.3, 423, 12, 13; H04N 7/26, 7/52, 7/56, 7/62

[56] References Cited

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Primary Examiner—Howard Britton

Attorney, Agent, or Firm—Peter Dichiera

[57] ABSTRACT

System, Device, And Method For Streaming A Multimedia File Encoded at a Variable Bitrate. The data is encoded at a variable bit rate and formed into packets having a server time stamp. The server time stamps are constructed so that the streaming of the packets will be substantially constant, not variable, and equal to a desired, budgeted bandwidth, such as one corresponding to fully utilizing a modem link. To schedule the sending of packets, the server uses the server time stamp, rather than, for example, the play-back time stamp. By having the data encoded at a variable bit rate, the otherwise-unused capacity, i.e., the capacity not used by the server, can be used to send packets needed in the future. This is accomplished by the server time stamps scheduling packets for transmission that will not be needed until the future.

2 Claims, 8 Drawing Sheets

EX1016

EX1016; Paper 21 (POR) at 11

21

Demonstrative Exhibit - Not Evidence.

EX1014; Paper 21 (POR) at 11

22

Demonstrative Exhibit - Not Evidence.

4

GROUND 1: CHOU DOES NOT DISCLOSE LIMITATION 1[D]

BAKER BOTTS



4.1

**CHOU DOES NOT DISCLOSE “DETERMINING THE CODE RATE
BASED ON ... AN AVAILABLE REPRODUCTION TIME.”**

A

PETITIONER'S ORIGINAL THEORY FAILS ON THE MERITS

BAKER BOTTS



The Petition's theory for "available time" fails

Overview of argument

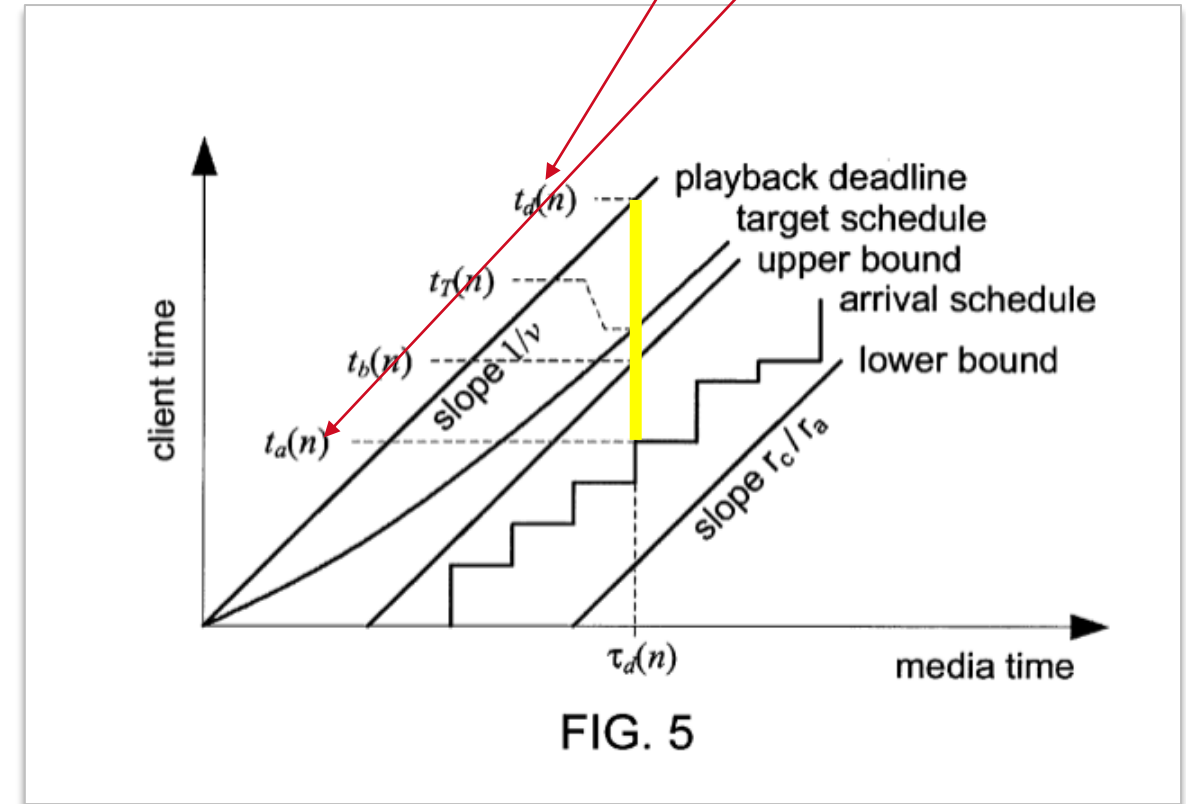
1. Petition maps the "gap" between "arrival time" (t_a) and "playback deadline" (t_d), also referred to as "client buffer duration," to the "available time" in the claims [Paper 2 (Pet.) at 38-40]
2. Chou *never* calculates or otherwise determines a value for this "client buffer duration" [Paper 21 (POR) at 18-19, 25-28; Paper 28 (SR) at 6-11]
 - Chou cannot determine a code rate based on the "gap" because it is never calculated or otherwise determined
3. Even if Chou did calculate a value for the gap, it is not used to determine the code rate [Paper 21 (POR) at 18-19, 32-33; Paper 28 (SR) at 6-11]
 - Chou teaches away from using the gap to determine the code rate. [Paper 21 (POR) at 35-41; Paper 28 (SR) at 10-11]
4. Even if Chou did calculate a value for the gap, it does not satisfy the "available time" limitation of the claims [Paper 21 (POR) at 18-19, 28-32; Paper 28 (SR) at 6-11]

The Petition's theory for "available time" fails

1. The Petition maps "available time" to the gap between playback deadline and frame arrival time ($t_d(n) - t_a(n)$), also referred to as "client buffer duration"

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 ($t_d(n) - t_a(n)$) 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.

Paper 2 (Petition) at 38-40



EX1004 (Chou), Fig. 5

The Petition's theory for "available time" fails

2. Chou never calculates or otherwise determines a value for this "client buffer duration" ($t_d - t_a$)

- Chou discloses estimating the "upper bound," not the "arrival time"
- Chou discloses that controlling the actual arrival time would result in poor quality overall



DR. JEREMY COOPERSTOCK

In other words, a POSITA would conclude that a "gap" between the "arrival time" and the "playback deadline" is not ever determined (or used in the calculation of the code rate for subsequent frames) because, as Chou warns, any attempts to control such parameter would "result in very poor quality overall."

EX2012 (Cooperstock), ¶ 91-92

[0070] With the state transition equation defined in Eq. (18), uninterrupted playback can be achieved by regulating the coding bit rate so that the client buffer does not under-flow. To introduce a margin of safety that increases over time, a target schedule is introduced, as illustrated in FIG. 5, whose distance from the playback deadline grows slowly over time. By regulating the coding bit rate, it is attempted to control the buffer tube upper bound so that it tracks the target schedule. If 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 and thus uninterrupted playback will be ensured. Note that controlling the actual arrival times (rather than their upper bounds) to the target would result in an approximately constant number of bits per frame, which would in turn result in very poor quality overall. By taking the leaky bucket model into account, it is possible to establish a control that allows the instantaneous coding bit rate to fluctuate naturally according to the encoding complexity of the content, within previously established bounds for a given average coding bit rate.

EX1004 (Chou), 170

The Petition's theory for "available time" fails

2. Chou *never* calculates or otherwise determines a value for this "client buffer duration" ($t_d - t_a$)



**DR. CLIFFORD
READER**

*Petitioner's
Own Expert*

Q. Staying on the gap between the playback deadline and the arrival time of a frame, my question is: Does Chou anywhere, either at the client or the server, disclose calculating a value for that gap?

...

A. What Chou describes is – I stated already that no one can calculate that because it is a point in a future -- in the future, and this is no different than rolling the dice in Las Vegas. You don't know, nobody knows, nobody can know on a variable rate channel when the arrival, if any will occur, so you can't calculate something that you don't have the data to calculate with. You don't know that until -- you don't know that until the frame arrives.

EX2015 (Reader), 94:17-95:8

Q. I think this is a fairly simple question. Does Chou disclose calculating the difference between the playback deadline and the arrival time, and if so, where?

...

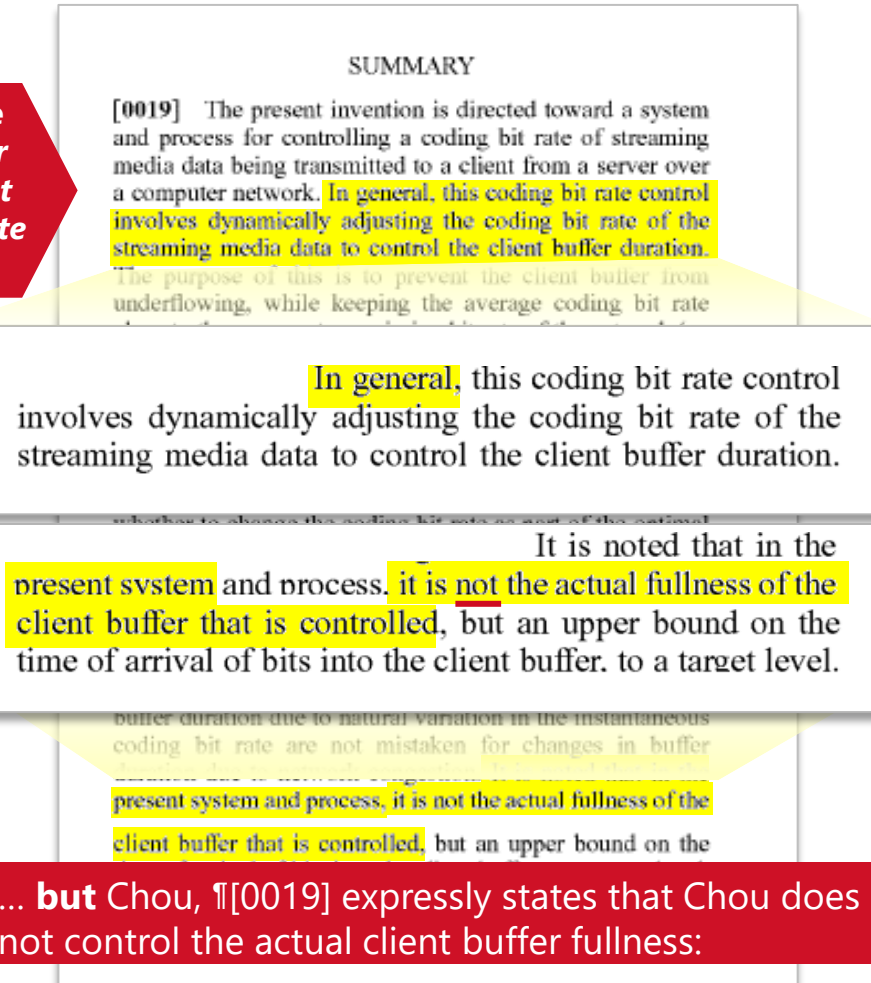
A. The difference t_d of (n) minus t_a of (n) does not appear in the equations on page 9 in paragraph 68.

EX2015 (Reader), 99:4-12

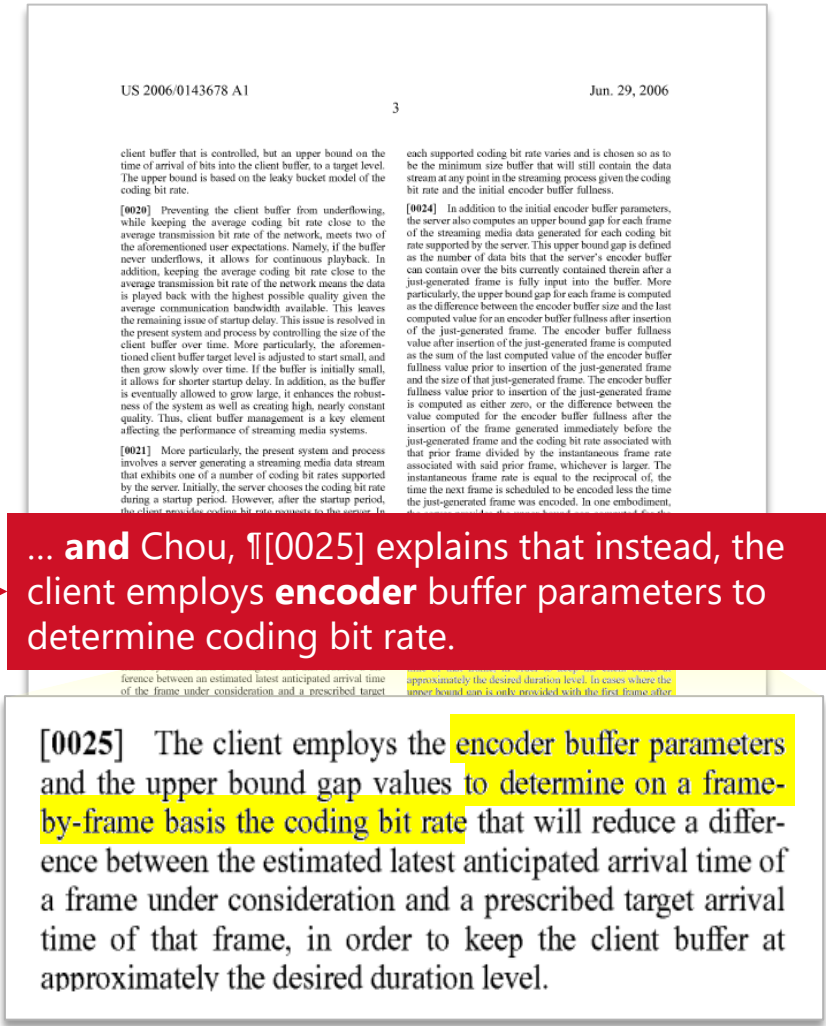
The Petition's theory for "available time" fails

2. Chou never calculates or otherwise determines a value for this "client buffer duration" ($t_d - t_a$)

Petitioner's Reply relies solely on the second sentence of Chou, ¶[0019] for the proposition that Chou uses "client buffer duration" to calculate code rate [See Reply at 7-9]



EX1004 (Chou), ¶19



EX1004 (Chou), ¶25

The Petition's theory for "available time" fails

2. Chou *never* calculates or otherwise determines a value for this "client buffer duration" ($t_d - t_a$)



DR. JEREMY COOPERSTOCK

Petitioner's reliance on Chou ¶19 for the conclusion that the "gap between the frame's arrival time and its playback deadline" is used as an input to determine the code rate for future content data to be transmitted, fails.

Paper 25 (Reply), §III.A.1.

Q. In paragraph 19, do you see the statement, "In general, this coding bit rate control involves dynamically adjusting the coding bit rate of the streaming media data to control the client buffer duration"?

A. The second sentence of the paragraph.

Q. Yes. And now at the bottom of the paragraph, present system and process, it is not the actual on the time of arrival of bits into the client bu

A. Yes, I see that.

Q. How do you reconcile those two statements?

A. So I understand now, having looked at the expressed in my Declaration, the purpose streaming media is not by dynamically adjusting generally done, but rather taking the approach, rather than controlling the actual fullness of the client buffer, it is instead the upper bound on the time

Q. If Chou is not controlling the actual fullness of the client buffer to a target level, does it need to know the past actual fullness of the client buffer?

A. No, it does not. It's operating independent of the contents of the client buffer.

Q. If Chou is not controlling the actual fullness of the client buffer to a target level, does it need to know the past actual fullness of the client buffer?

A. No, it does not. It's operating independent of the contents of the client buffer.

EX1041 (Cooperstock Dep. Tr.), 167:3-168:12.

The Petitioner's theory for "available time" fails – under any construction

2. Chou *never* calculates or otherwise determines a value for this "client buffer duration" ($t_d - t_a$)

- **Petitioner's interpretation of "based on":** "For some event (A) to be "based on" some factor (B), it merely requires that (B) have some impact or influence on (A)—even if indirectly rather than directly, as NEC asserts." Paper 25 (Reply) at 4.
- Because Chou never calculates or otherwise determines a value for "client buffer duration," it cannot "have [any] impact of influence" under Petitioner's interpretation

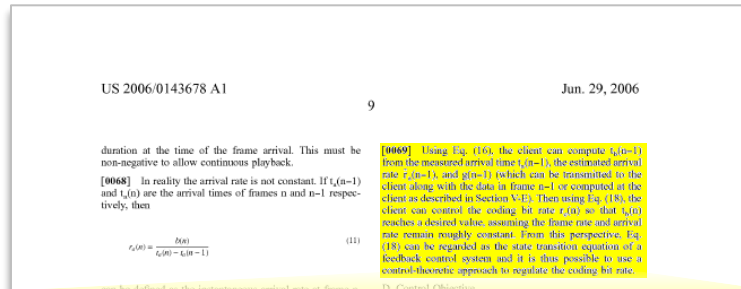
Moreover, even adopting Petitioner's apparent claim construction position, Chou fails to disclose limitation 1[d] because Chou never discloses that the "factor[s]" (*i.e.*, the available time or the remaining time) are used to "impact or influence" the determination of the code rate, as evidenced by Chou's failure to disclose that the factors are ever determined (much less used) for the determination of the code rate. *See* EX2012, §§ V.B.2-4.

Paper 28 (SR) at 4

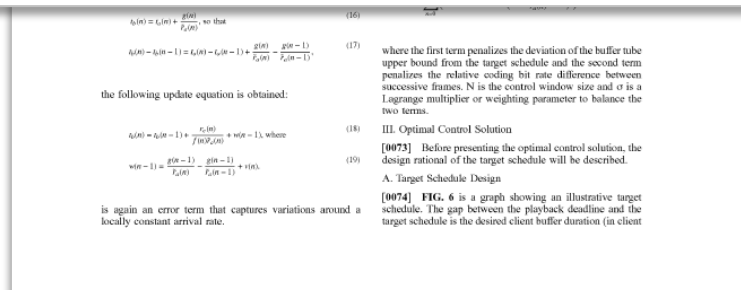
The Petition's theory for "available time" fails

3. Even if Chou did calculate a value for the gap, it is not used to determine the code rate

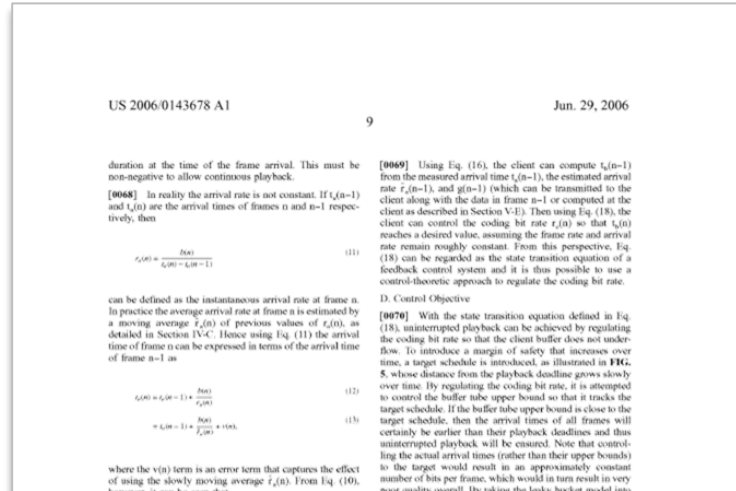
Chou's equation 18 does not use the "gap" between "playback deadline" and "arrival schedule," ($t_d - t_a$) **either directly or indirectly** to determine code rate



[0069] Using Eq. (16), the client can compute $t_b(n-1)$ from the measured arrival time $t_a(n-1)$, the estimated arrival rate $r_a(n-1)$, and $g(n-1)$ (which can be transmitted to the client along with the data in frame $n-1$ or computed at the client as described in Section V-E). Then using Eq. (18), the client can control the coding bit rate $r_c(n)$ so that $t_b(n)$ reaches a desired value, assuming the frame rate and arrival rate remain roughly constant. From this perspective, Eq. (18) can be regarded as the state transition equation of a feedback control system and it is thus possible to use a control-theoretic approach to regulate the coding bit rate.

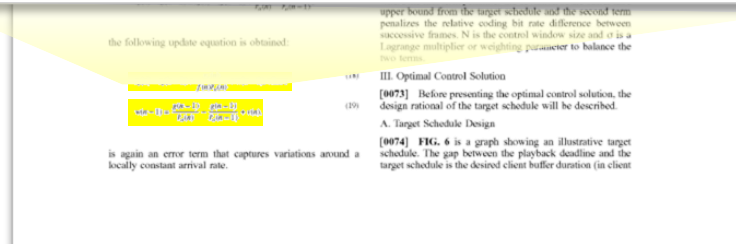


EX1004 (Chou), 169



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

$$w(n-1) = \frac{g(n-1)}{r_a(n)} - \frac{g(n-1)}{r_a(n-1)} + v(n). \quad (19)$$



EX1004 (Chou), Eqs. 18-19

The Petition's theory for "available time" fails

3. Even if Chou did calculate a value for the gap, it is not used to determine the code rate

The "gap" cannot be used to determine code rate because it reflects client buffer duration "***at the time of the frame arrival***"

Thus 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 (Chou), ¶67

If the frame has arrived at client buffer, its code rate necessarily has already been determined

The Petition's theory for "available time" fails

3a. Chou teaches away from using the gap to determine the code rate



DR. JEREMY COOPERSTOCK

These explicit disclosures and warnings would color the rest of a POSITA's analysis of what *Chou* is disclosing. A POSITA would understand that controlling the actual fullness of the buffer would need to be achieved by controlling the actual arrival times of the frames, which *Chou* states should not be done. As such, a POSITA would understand that using the actual fullness of the buffer at the time of arrival of a frame "n," which *Chou* teaches is the difference between frame "n's" playback time and actual arrival time, would mean that the determination of the code rate for frame "n+2" is being determined on the basis of the actual arrival time of the frames – which a POSITA would understand to be hazardous to the quality of playback in view of *Chou's* warnings. EX1004, ¶70. In other words, in my opinion, a POSITA would understand that *Chou* teaches the actual buffer fullness should not be considered in calculating the code rate for subsequent frames.

It is noted that in the present system and process, it is not the actual fullness of the client buffer that is controlled, but an upper bound on the time of arrival of bits into the client buffer, to a target level.

EX1004 (Chou), ¶119

uninterrupted playback will be ensured. Note that controlling the actual arrival times (rather than their upper bounds) to the target would result in an approximately constant number of bits per frame, which would in turn result in very poor quality overall. By taking the leaky bucket model into account, it is possible to establish a control that allows the instantaneous coding bit rate to fluctuate naturally according to the encoding complexity of the content, within previously established bounds for a given average coding bit rate.

EX1004 (Chou), ¶170

EX2012 (Cooperstock), ¶ 103

Paper 21 (POR) at 35-41; Paper 28 (SR) at 10-11

The Petition's theory for "available time" fails

3a. Chou teaches away from using the gap to determine the code rate

Petitioner's Reply argument (see Paper 25 at 9) ignores the claim language ("based on the content data stored")

[T]he Board correctly reasoned that the cited statement in Chou does not mean that the buffer fullness is not affected by controlling the upper bound to the target.

Paper 25 (Reply) at 9

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:

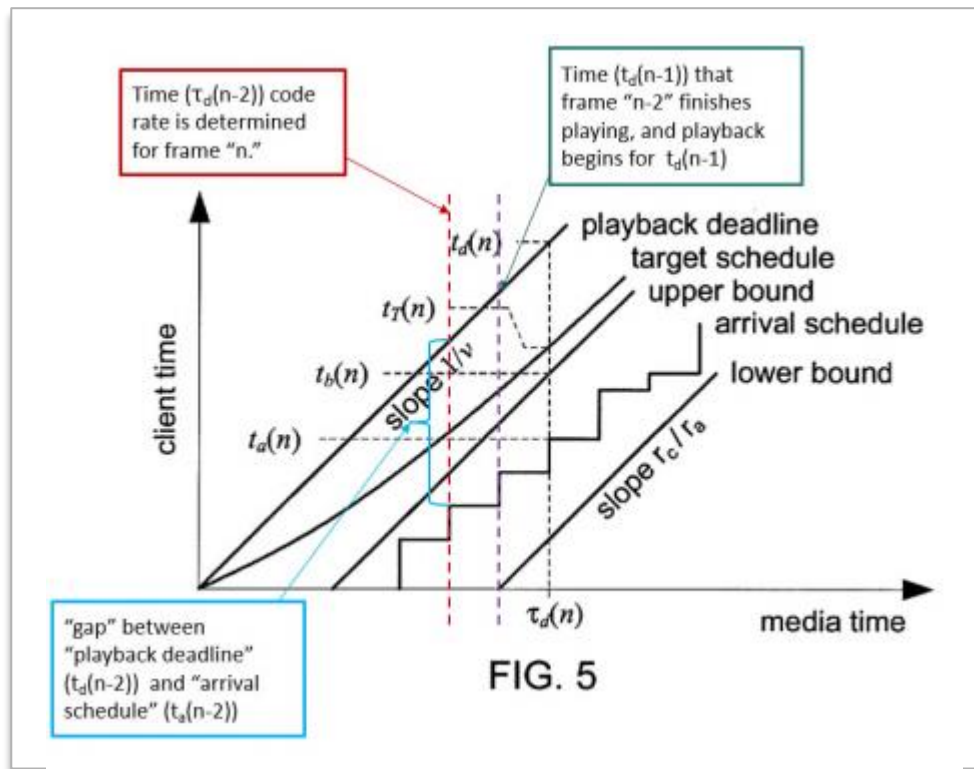
EX1001 (101 Patent), Cl. 1

Affecting **future** buffer duration does not mean code rate is determined based on "the **content data stored in the storage device**"

The Petition's theory for "available time" fails

4. Even if Chou did calculate a value for the gap, it does not satisfy the "available time" limitation of the claims

Chou's "gap" is not the "time available for reproducing content based on the content data stored" as required by claim 1[d]



EX1004 (Chou), Fig. 5 (annotated); EX2012, ¶92

[0081] As each frame arrives at the client, a feedback loop can send a message to the server to adjust the coding bit rate. Note, however, that by the time frame n arrives completely at the client, frame $n+1$ has already started streaming from the server. Thus the coding bit rate $r_c(n+1)$ for frame $n+1$ must already be determined by time $t_a(n)$. Indeed, at time $t_a(n)$, frame $n+2$ is the earliest frame for which the controller can determine the coding bit rate. Hence at time $t_a(n)$, the controller's job must be to choose $r_c(n+2)$. This one-frame delay in the feedback loop must be explicitly accounted for.

EX1004 (Chou), ¶81

The Petition's theory for "available time" fails

4. Even if Chou did calculate a value for the gap, it does not satisfy the "available time" limitation of the claims

Chou's "**one-frame delay**": Chou does not disclose "acquiring" the value of $t_d(n-2) - t_a(n-2)$ or transmitting it back to the server, and Petitioner does not cite to any evidence that Chou does.



DR. CLIFFORD

READER

Petitioner's

Expert

A POSITA would have been able to easily modify Equations 18 and 19 (and other equations leading up to Equation 18) to account for one-frame delay referenced by Chou. As I mentioned earlier, the client buffer duration (difference between playback deadline and arrival schedule) corresponds to the claimed "available time." Ex. 1006, ¶153.

EX1040 (Reader), ¶16

Conclusory
(no explanation
as to why or how)



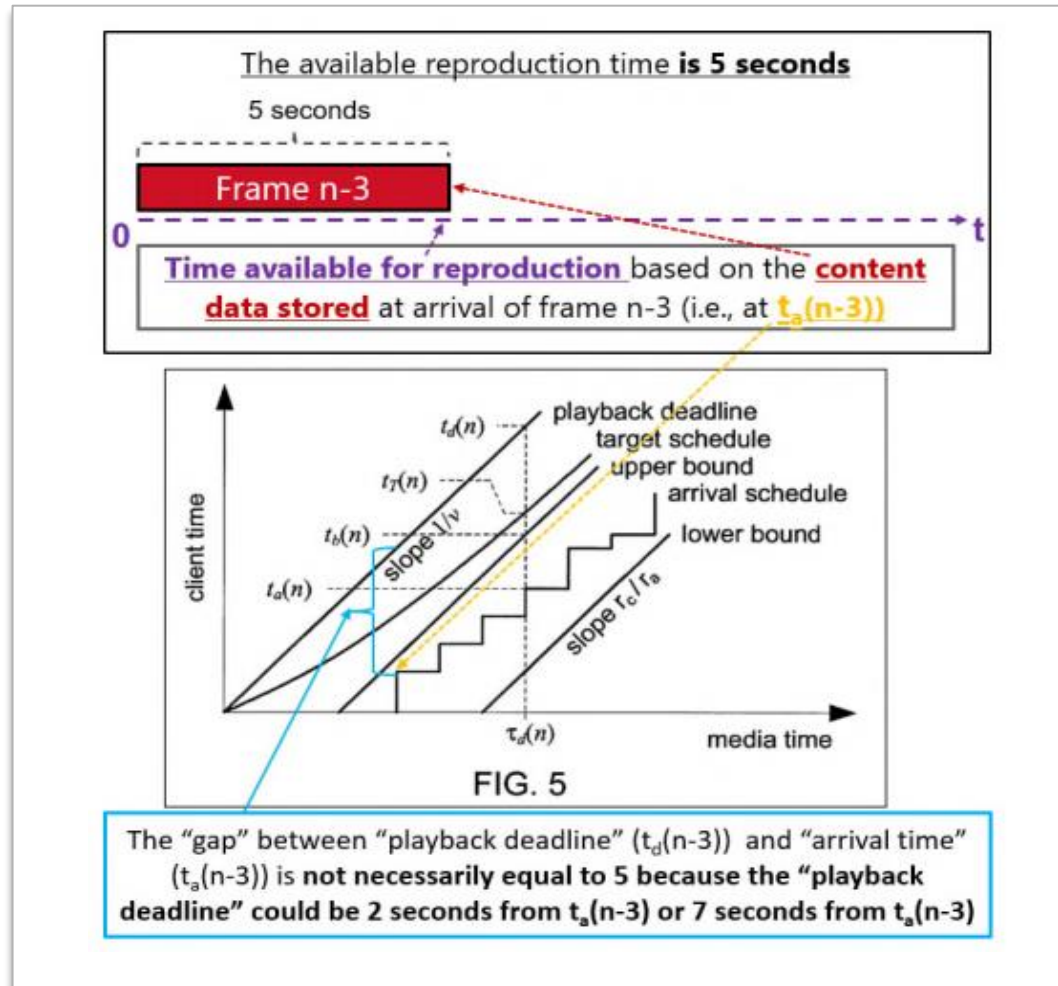
Xerox Corp. v. Bytemark, Inc., No. IPR2022-00624, Paper No.12 (P.T.A.B. Feb. 10, 2023) (Vidal, Dir.)

The Board was "correct in giving little weight" to the expert testimony because the "declaration merely offered conclusory assertions without underlying factual support and repeated, **verbatim**, [Xerox's] conclusory arguments."

The Petition's theory for "available time" fails

4. Even if Chou did calculate a value for the gap, it does not satisfy the "available time" limitation of the claims

Chou's "gap" is not the "time available for reproducing content based on the content data stored" as required by claim 1[d]



EX1004 (Chou), Fig. 5 (annotated); EX2012, ¶193

B

PETITIONER'S NEW THEORY THAT "G(N-1)" TEACHES A "CLIENT BUFFER DURATION" IS UNTIMELY AND FAILS ON THE MERITS

The Reply's new theory for "available time" fails

Overview of argument

1. Petitioner's new theory based on $g(n)$ is not in the petition, is untimely, and should be ignored. [Paper 28 (SR) at 6-7, 11-13]
2. Petitioner's new theory based on $g(n)$ fails on the merits. [Paper 28 (SR) at 6-7, 13-18]
 - a. $g(n)$ is an **encoder** side variable; it thus does not reflect a parameter of the decoder (client) buffer, as required by claim 1. [Paper 28 (SR) at 13-16]
 - b. $g(n)$ is a **size** variable; not a **time** variable. [Paper 28 (SR) at 16-17]
 - c. Petitioner does not explain how or why Equation 18 would account for the "playback deadline" and "target schedule." [Paper 28 (SR) at 17-18]

The Reply's new theory for "available time" was untimely

1. Petitioner's new theory based on $g(n)$ is not in the petition, is untimely, and should be ignored

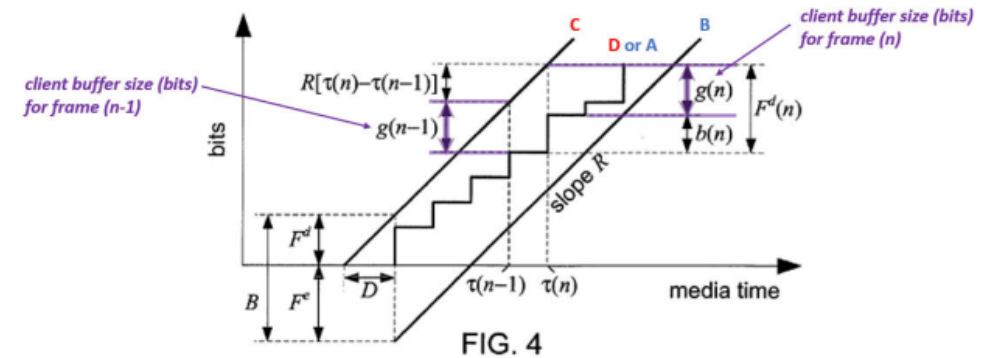
Petition, at 38-40

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 $(t_d(n) - t_a(n))$ 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.

Paper 2 (Petition) at 38-40

No mention of equations 18, 19, 16, gaps $g(n)$, $g(n-1)$ or Fig. 4

Reply, at 14



While gaps $g(n)$ and $g(n-1)$ are denoted in bits in Figure 4, the decoder buffer size can be readily converted to the corresponding client buffer duration (in seconds). See Cooperstock-Tr. 40:12-41:6; Chou, [0007].

Notably, Equation 18, through Equations 19 and 16, directly uses the value $g(n-1)$. Accordingly, Chou determines code rate $r_c(n)$ for frame (n) based on gap $g(n-1)$, which represents the size of the decoder when frame (n) arrives or the client buffer duration at that time.

Paper 28 (SR) at 6-7, 11-13

2. Petitioner's new theory based on $g(n)$ fails on the merits

Petitioner's new theory regarding the gap $g(n-1)$ relies on three flawed premises.

1

First, the gaps $g(n-1)$ and $g(n)$ do not denote the number of bits in the decoder (client) buffer, but instead is a parameter of the encoder buffer and not a parameter of the decoder (client) buffer.

2

Second, the Reply admits that $g(n-1)$ is in bits and not time, which Petitioner suggests does not matter because "it can be readily converted." Reply 14, 15. Yet, this conclusory statement is insufficient.

3

Third, Petitioner does not explain how or why a "POSITA would have understood that when the Equation 18 accounts for the 'playback deadline' and 'target schedule' of Figure 5, it would factor in the client buffer size according to this model."

2. Petitioner's new theory based on $g(n)$ fails on the merits

a. $G(n)$ is an **encoder** side variable; it thus does not reflect a parameter of the decoder (client) buffer, as required by claim 1

US 2006/0143678 A1

3

Jun. 29, 2006

client buffer that is controlled, but an upper bound on the time of arrival of bits into the client buffer, to a target level. The upper bound is based on the leaky bucket model of the coding bit rate.

[W20] Preventing the client buffer from underflowing, while keeping the average coding bit rate close to the average transmission bit rate of the network, meets two of the aforementioned user expectations. Namely, if the buffer is not empty, the client buffer can be kept full. 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. This leaves the client buffer empty only when the network is congested, the present system and protocol by controlling the size of the client buffer over time. More particularly, the aforementioned client buffer target level is adjusted to start small, and then grow slowly over time. If the buffer is initially small, it allows for shorter startup delay. In addition, as the buffer size grows, the client buffer is kept full, which increases the resiliency of the system as well as creating high, nearly constant quality. Thus, client buffer management is a key element affecting the performance of streaming media systems.

[0021] More particularly, the present system and process involves a server generating a streaming media data stream that exhibits one of a number of coding bit rates supported by the server. Initially, the server chooses the coding bit rate during a startup period. However, after the startup period, the client provides coding bit rate requests to the server. In response, the server transmits the streaming media data at the most appropriate supported coding bit rate closest to the rate requested by the client. The coding bit rates requested by the client are those estimated to provide a high quality playback of the streaming media data while still keeping a decoder buffer of the client used to receive streaming media data from the server filled to a desired duration level.

[0022] The client computes the coding bit rate that will provide the desired results on an ongoing basis using the aforementioned linear quadratic optimal control technique. This coding bit rate computation involves determining on a frame-by-frame basis a coding bit rate that reduces a difference between an estimated latest anticipated arrival time of the frame under consideration and a prescribed target arrival time, while at the same time reducing the change in the coding bit rate to a prescribed degree. In one embodiment involving the aforementioned leaky bucket model, the coding bit rate computations are based on parameters indicative of the state of the encoder buffer of the server. These parameters are computed by the server and provided to the client along with the streaming media data.

[0023] More particularly, the server first computes a set of parameters defining an initial state of the encoder buffer as it would exist if a data stream corresponding to a supported coding bit rate were streamed therefrom. A separate set of parameters is computed for each of the supported coding bit rates, and are provided to the client in a preamble to the streaming media data. These parameters include the coding bit rate associated with the data stream, the size of the encoder buffer employed with the coding bit rate of the data stream, and a value indicative of the initial encoder buffer fullness exhibited at the coding bit rate of the data stream. It is noted that the size of the encoder buffer employed with

each supported coding bit rate varies as the bit rate of the stream. B_{min} will be the minimum size buffer that will support streaming at any point in the streaming profile. B_{max} is the maximum buffer size, bit rate and the initial encoder buffer size.

2024] In addition to the initial encoding, the server also computes an upper bound on the size of the streaming index data generated by the encoder. The encoder computes this value as the number of data bits that the server must contain over the bits currently computed (a constant frame is fully input into the encoder). The upper bound for U is computed as the sum of the just-generated frame. The encoder computes the value for an encoder buffer for the just-generated frame. The encoder value after insertion of the just-generated frame as the sum of the just computed value and the value of the just-generated frame and the size of that just-generated frame. The fullness value prior to insertion of the just-generated frame is computed as either zero, or the difference between the encoder buffer value computed for the just-generated frame and the encoder buffer value computed for the just-generated frame and the coding rate associated with said prior frame, if the instantaneous frame rate is equal to or less than the frame rate. The time next frame is scheduled to be received by the client from the server provides the upper bound given the first frame of a sequence of frames generated in the coding rate to the client along with the coding rate associated with the sequence of frames. In another embodiment, the server provides with every frame generated.

[0025] The client employs the encoder and the upper bound gap values to determine the coding bit rate on a frame-by-frame basis the coding bit rate that once between the estimated latest anticipated frame under consideration and a previous frame of that frame, in order to keep approximately the desired duration level. The upper bound gap is only provided with a change in the coding bit rate, the client uses the upper bound gap for the frames that do not include a change in the coding bit rate. It is also noted that given the aforementioned buffer conditions, it is possible for the client to use the upper bound gap values for every frame in an alternate embodiment where the server computes and provides the gap values on a frame-by-frame basis. The client computer can still compute then

[0026] When a frame with a new average coding bit rate arrives at the client there is a shift in the upper bound gap. This shift can be on the order of seconds and hence, rather than being negligible, can be confusing to the controller. One solution to this is to introduce a simultaneous shift in the control target schedule. To this end, the server also computes a shift value for each frame representing the first frame after a coding bit rate change. This shift value represents the difference between the upper bound gap that would be associated with the frame generated immediately before this first frame had it been encoded at the new coding

[0024] In addition to the initial encoder buffer parameters, the server also computes an upper bound gap for each frame of the streaming media data generated for each coding bit rate supported by the server. This upper bound gap is defined as the number of data bits that the server's encoder buffer can contain over the bits currently contained therein after a just-generated frame is fully input into the buffer. More

EX1004 (Chou), ¶24

2. Petitioner's new theory based on $g(n)$ fails on the merits

a. $G(n)$ is an **encoder** side variable; it thus does not reflect a parameter of the decoder (client) buffer, as required by claim 1

Section V-E:

[0069] Using Eq. (16), the client can compute $t_b(n-1)$ from the measured arrival time $t_a(n-1)$, the estimated arrival rate $\tilde{r}_a(n-1)$, and $g(n-1)$ (which can be transmitted to the client along with the data in frame $n-1$ or computed at the client as described in Section V-E). Then using Eq. (18), the client can control the coding bit rate $r_c(n)$ so that $t_b(n)$ reaches a desired value, assuming the frame rate and arrival rate remain roughly constant. From this perspective, Eq. (18) can be regarded as the state transition equation of a feedback control system and it is thus possible to use a control-theoretic approach to regulate the coding bit rate.

E. Optimal Rate Control at the Client

[0113] Whenever a new coding bit rate starts, the client receives the value $g(n)$ along with the new frame. The values of $g(n)$ for successive frames can be then inferred by the client itself based on the coding bit rate $\hat{r}_c(n)$ and the frame size $b(n)$. The client records the arrival frame time $t_a(n)$, calculates the buffer tube upper bound $t_b(n)$ and then computes the deviation $e(n)$. If there is a coding bit rate switch, it will also compute the buffer tube shift and adjust the control target schedule accordingly. Then, $e(n)$ is fed to the optimal rate controller, which outputs a desired new coding bit rate. The latest new coding bit rate is fed back to the sender whenever there is a feedback opportunity, which could be generated at regular intervals or on-demand.

EX1004 (Chou), ¶169

EX1004 (Chou), ¶113

2. Petitioner's new theory based on $g(n)$ fails on the merits

a. $G(n)$ is an **encoder** side variable; it thus does not reflect a parameter of the decoder (client) buffer, as required by claim 1

Paragraph 66 of Chou does provide an equation for **decoder** buffer fullness ($F_d(n)$), based on $g()$:

[0066] In the following the gap $g(n)$ at frame n between the buffer tube upper bound and the coding schedule is considered, as depicted in FIG. 4. Note that the decoder buffer fullness $F^d(n)=B-F^e(n)$ can also be expressed

$$F^d(n) = b(n) + g(n) = g(n-1) + \frac{r_c(n)}{f(n)}, \quad (10)$$

where $r_c(n)$ is the coding bit rate of the buffer tube, now taking into account that different frames may lie in different buffer tubes with different coding bit rates as coding bit rate control is applied and streams are switched.



DR. JEREMY COOPERSTOCK

In other words, Chou is asking the reader to ignore the realities of network behavior for purposes of explanation that the number of bits available to be loaded in (i.e., the remaining capacity of) the encoder buffer (gap $g(n)$) in addition to the bits that have been added (frame size $b(n)$) to the leaky bucket can be used as a proxy for the decoder buffer fullness. See Ex. 1004, ¶ 65. ... In reality, a POSITA would understand the sum of the buffer fullness of the encoder and the buffer fullness of the decoder would not be equal to the total size of encoder (B).

EX1004 (Chou), ¶66

EX2016 (Cooperstock), ¶14-17

...but $g(n)$ still does not represent the decoder buffer and **$F_d(n)$ is not used** to determine code rate; **...and** Equation 10 is based on assumptions inconsistent with reality

2. Petitioner's new theory based on $g(n)$ fails on the merits

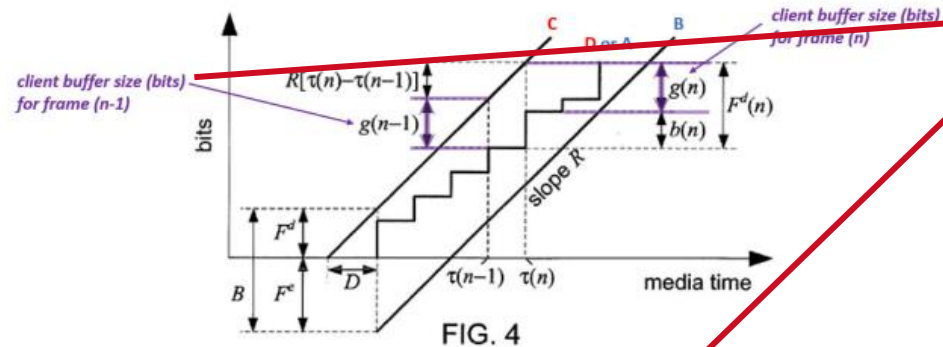
b. $G(n)$ is a **size** variable; not a **time** variable



**DR. CLIFFORD
READER**

*Petitioner's
Expert*

13. Gaps $g(n)$ and $g(n-1)$ are depicted in annotated Figure 4 below:



In the figure above, **gaps $g(n)$ and $g(n-1)$** are denoted in bits on the y-axis.

However, a POSITA would be able to easily convert the buffer size in bits into the corresponding playback duration in seconds providing the coding rate r_c is known

Thus, Equation 18 in Chou can be used to calculate the coding rate $r_c(n)$ for frame (n) based on the size of the decoder buffer (**gap $g(n-1)$** either in bits or in seconds).

Dr. Reader admits that $g()$ is measured in bits

Dr. Reader admits that coding rate information is needed to convert bits into time

But... no explanation of **how** or **why** a POSITA would convert bits into time

EX1040 (Reader), ¶13

2. Petitioner's new theory based on $g(n)$ fails on the merits

b. $G(n)$ is a **size** variable; not a **time** variable

Converting bits into time is not as trivial as Dr. Reader implies



DR. JEREMY COOPERSTOCK

[T]he decoder buffer may have two or more frames that are each encoded at a different coding rate. The buffer duration is not simply the total amount of bits divided by a coding rate, but instead a sum of the size of each frame in the decoder buffer divided by its respective coding rate. ... Thus, Dr. Reader fails to explain (1) why a POSITA would modify Chou to have the client send $g(n-1)$ to the server; and (2) include information regarding the coding rate for each frame in the decoder buffer to ascertain the time available for reproducing content. ... [I]n my opinion, even if a POSITA *could* modify Chou to monitor the frames in the buffer and their respective coding rates to determine a client buffer duration, the POSITA would not be motivated to because Chou never suggests that such a value is of importance.

EX2016 (Cooperstock), ¶21

2. Petitioner's new theory based on g(n) fails on the merits

c. Petitioner does not explain how or why Equation 18 would account for the “playback deadline” and “target schedule.”

Paper 25 (Reply), p. 15:

Thus, a POSITA would have understood that when the Equation 18 accounts for the “playback deadline” and “target schedule” of Figure 5, it would factor in the client buffer size according to this model. Reader-Supp-Decl., ¶14; Chou, [0067].

Accordingly, a POSITA would have understood that when the Equation 18 accounts for the “playback deadline” and “target schedule” of Figure 5, it would factor in the client buffer size according to this model. Id., ¶67.

Conclusory
(no explanation
as to why or how)

EX1040 (Reader), ¶14



Xerox Corp. v. Bytemark, Inc., No. IPR2022-00624, Paper No.12 (P.T.A.B. Feb. 10, 2023) (Vidal, Dir.)

The Board was “correct in giving little weight” to the expert testimony because the “declaration merely offered conclusory assertions without underlying factual support and repeated, **verbatim**, [Xerox’s] conclusory arguments.”

C

**“TARGET BUFFER DURATION” CANNOT
SATISFY THE “AVAILABLE TIME” LIMITATION**

“Target buffer duration” cannot satisfy the “available time” limitation

The ID’s discussion of “target buffer duration”

a. an available reproduction time

We have reviewed Patent Owner’s arguments and evidence and determine that Petitioner has established that Chou’s target buffer duration, which provides sufficient time between a target arrival time of a frame and its playback time, represents a time available for reproducing the content based on the content data stored in the storage device of the reception device and, accordingly, teaches the argued “available reproduction time.” *See* Pet. 8 (asserting Chou teaches an available reproduction time). Furthermore, to

Paper 16 (ID) at 41

The Petition never relied on “target buffer duration” for the “available time” limitation

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. ... 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

Paper 2 (Pet.) at 8; *see also id.* at pp. 38-40

“Target buffer duration” cannot satisfy the “available time” limitation

“Target buffer duration” cannot be the “available time” because it is not based on “the content data stored in the storage device,” as recited by claim 1, and is not used to determine the code rate



DR. JEREMY COOPERSTOCK

Chou describes the “target buffer duration” depicted in Fig. 6 as “the desired client buffer duration.” EX1004, ¶74. A POSITA reading Chou would understand this to mean that the “target buffer duration” is not tied to any data that is already stored in the storage device of the reception device. In my opinion, a POSITA would understand that the “target buffer duration” specifies the desired amount of content data to be stored in the storage device at some future time, and not a value based on the content data already stored in the storage device.

EX2012 (Cooperstock), ¶81

“Target buffer duration” cannot satisfy the “available time” limitation

Despite Dr. Reader’s deposition testimony, Petitioner’s Reply confirms that it is not relying on “target buffer duration”

Q. The available production time in the claims, in your opinion, is met by the duration defined by t sub d minus capital T, correct?

A. That’s correct, yes.

NEC mischaracterizes both the Petition and the Board’s decision. In fact, the Board repeatedly acknowledged Petitioner’s mapping of Chou’s **actual client buffer duration** to “Available Time.” See DI, 35-36

EX2015 (Reader), 142:24-143:2

Paper 25 (Reply) at 9

4.2

**CHOU DOES NOT DISCLOSE “DETERMINING THE
CODE RATE BASED ON A REMAINING TIME.”**

BAKER BOTTS



A

PETITIONER'S ORIGINAL THEORY FAILS ON THE MERITS

Petitioner's Original Theory Fails

The Petition alleged that Chou's "remaining time" was met by the "target buffer duration" of Chou.

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.

-36-

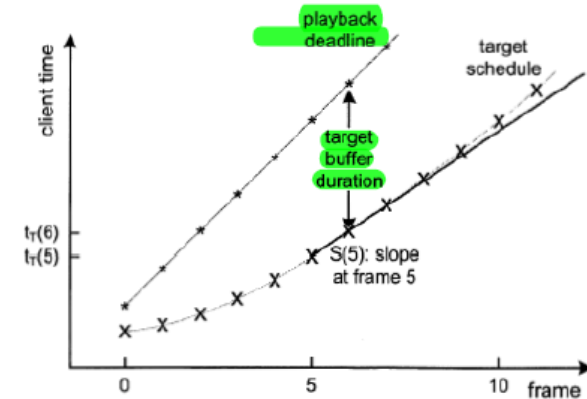


FIG. 6

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

Petitioner's Original Theory Fails

In its Reply to NEC's POR, Peloton no longer contended that the "target buffer duration" meets the claimed "remaining time" – but instead introduced a new theory

2. Petitioner did not Map Remaining Time to Chou's "Target Buffer Duration."

Paper 25 (Petitioner's Reply) at 20.

B

**THE REPLY'S NEW THEORY FOR "REMAINING TIME"
IS UNTIMELY AND FAILS ON THE MERITS**

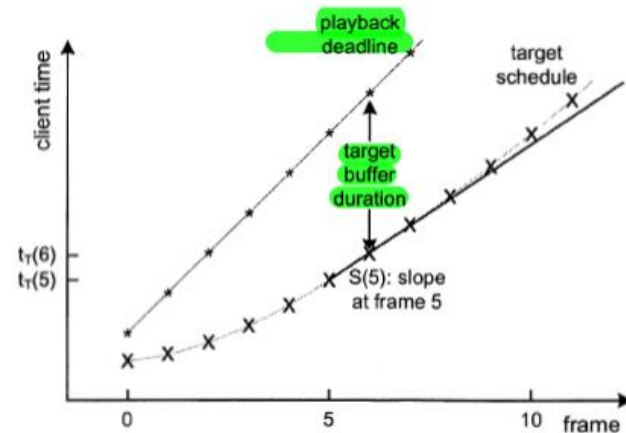


The Reply's new theory for "remaining time" is untimely

The Reply introduces a new variable, $t_{\text{present}}(n)$ and introduces new arguments concerning Eq. 18 not discussed in the Petition

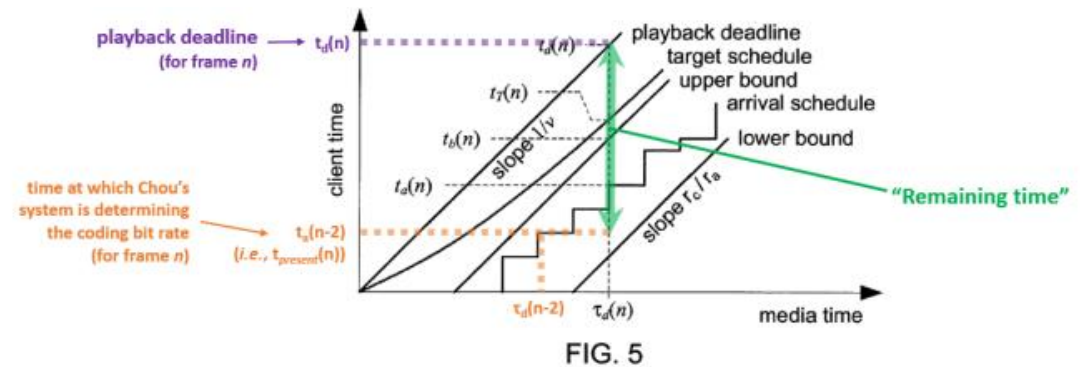
Petition, p.37

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, ¶¶10070-75. 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. ¶¶10070-75. EX1006. ¶147



Reply, p.19-20 (see also *id.* at p. 22 concerning Eq. 18)

As shown in annotated Figure 5 below, when Chou determines the code rate $r_c(n)$ for frame (n), the claimed "present moment" $t_{\text{present}}(n)$ for the frame (n) is arrival time $t_a(n-2)$. Reader-Supp.-Decl., ¶21. The playback deadline $t_d(n)$ for frame (n) is the claimed "reproduction start time." *Id.* Accordingly, when determining the code rate for frame (n), the "gap" between these two—i.e., playback deadline, $t_d(n)$, and the present moment, $t_a(n-2)$ is the "remaining time" before reproduction start time set as time at which the reception device"—Chou's client—"starts reproduction of content from a present moment." *Id.*



The Reply's new theory for "remaining time" is untimely

Petitioner's sur-sur-reply **does not** dispute that Petitioner's "remaining time" arguments in Reply are new

Patent Owner Sur-Reply, p.20	Petitioner Sur-Sur-Reply
"Petitioner introduces a new variable t_{present}, redraws Figure 5 with its own annotations, and concludes that the newly drawn gap "is consistent with the 'gap' referenced in the Petition." Reply 19-20. But Petitioner's 'gap' referenced in the Petition, does not ever mention t_{present} or provide any rationale as to how Chou is considering the 'remaining time' from the 'present moment.' Pet., 37. Moreover, in its reply, Petitioner introduces new arguments that equation (18) of Chou supports its position, but, as shown below, fails to show how Equation (18) considers the 'present moment' relative to the 'reproduction start time.'" Reply, 22."	?

The Reply's new theory for "remaining time" fails on the merits

Petitioner's new theory alleges that the duration of time defined by $t_d(n) - t_a(n-2)$ is a factor that the code rate is determined based on, but none of Petitioner's equations (or Chou's equations and discussion) suggest that it is

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

$$w(n-1) = \frac{g(n-1)}{\tilde{r}_a(n)} - \frac{g(n-1)}{\tilde{r}_a(n-1)} + v(n). \quad (19)$$

EX1004 (Chou), Eqs. 18-19

$$I = \sum_{n=0}^N \left((t_b(n) - t_T(n))^2 + \sigma \left(\frac{r_c(n+1) - r_c(n)}{\tilde{r}_a(n)} \right)^2 \right), \quad (20)$$

EX1004 (Chou), Eq. 20

The Reply's new theory for "remaining time" fails on the merits

Peloton proves its new arguments fail through its own admission.

"Petitioner states that 'Equation (18)' compares the present moment $t_{\text{present}}(n)$ 'for frame (n)' to the upper bound $t_b(n)$ 'for frame (n)'. Reply, 22. Accordingly, accepting this as true *arguendo*, Petitioner admits that Equation 18 does not compare the **present moment** $t_a(n-2)$ to $t_b(n)$ [(i.e., the alleged reproduction start time) **for the same frame "n"**].

Reply at 22

Chou never suggests comparing $t_a(n-2)$ to the upper bound ($t_b(n)$) **two frames later** and does not suggest determining the code rate based on a duration of time between those two times, as required by the claims.

Paper 28 (SR) at 20-23

5

GROUND 2 AND 3

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Ground 2 (Chou + Wang) fails

- The ID found that there was insufficient evidence of motivation to combine wang with chou:

(ii) Motivations to Combine

Second, at this preliminary stage, we are not persuaded by Petitioner’s contentions that a POSITA would have been motivated to combine the teachings of Chou and Wang. Pet. 74. As argued by Patent Owner, “Wang and Chou are directed to different technologies—active encoding applications and transport-layer protocols,” (*see* Prelim. Resp. 30, 34–35), and Petitioner does not persuasively explain, for example, why the two methods would be combined into a single method rather than implemented independently in their respective transport and application layers.

Institution Decision at 54

- Petitioner’s Reply does not advance any additional evidence or argument arguments regarding Ground 2.
 - Thus, the Board should find that there would be no motivation to combine the references for at least the same reasons it identified in the ID

Ground 3 (Chou + Nobuyoshi) fails

- Only related to dependent claims; does not cure the deficiencies in Ground 1

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

Nobuyoshi was considered at the time the '101 Patent was prosecuted. EX2012, ¶150. *Nobuyoshi* is relied on in combination with *Chou* as allegedly disclosing claims 5, 7, and 15. *Id.* (citing Pet., §IX.C). The Petition does not allege that *Nobuyoshi* remedies the deficiencies of *Chou* as they relate to Claim Element [1d] discussed above. *Id.* Indeed, as evidenced by the Examiner's consideration of *Nobuyoshi* during prosecution, it does not disclose, teach, or suggest the elements of Claim 1 (or the other independent claims). *Id.*

Paper 21 (POR) at 62

6

**DR. READER'S OPINIONS ARE
UNRELIABLE**

BAKER BOTTS



Dr. Reader admitted that he did not apply the standard of what a POSITA would have understood at the time of the invention, instead he considered the prior art and what *he as an expert* understands.



**DR. CLIFFORD
READER**

*Petitioner's
Expert*

A. I think that each of the grounds in my declaration discuss that the prior art renders obvious the various claims limitations or sublimitations of the claims. And I'm not quite sure how to answer your question, again, because I'm not an attorney, but the art in combination with my education and experience discloses what is being claimed.

Q. Let me make sure I got that right. You're saying that in your analysis, you considered what the prior art discloses in combination with your education and experience?

...

A. In brief, that's what I said.

EX2015 (Reader), 39:17-40:13

Dr. Reader's Analysis is Unreconcilably Flawed



**DR. CLIFFORD
READER**

*Petitioner's
Expert*

Dr. Reader *admitted* that he used the challenged claims as a “roadmap” to develop his invalidity ground, explaining that he “considered the claim as a whole...and used that as a roadmap to find limitations in the prior art.”

Q. As part of your analysis here you considered the claim as a whole and you also considered the meaning of those claim terms and used that as a road map to find the limitation in the prior art, correct?

A. Correct.



Ruiz v. A.B. Chance Co., 357 F.3d 1270, 1275 (Fed. Cir. 2004)

“using the invention as a roadmap to find its prior art components, would discount the value of combining various existing features or principles in a new way to achieve a new result—often the very definition of invention.”

Dr. Reader was unable to consistently explain which portion of Chou allegedly teaches the “available reproduction time.”

Dr. Reader came to the new conclusion that **three different calculations** based on variables of Chou could correspond to the “available reproduction time,” but was unable to say which one of them definitively corresponded to the “available reproduction time.”



**DR. CLIFFORD
READER**

*Petitioner's
Expert*

Q. Okay. Your opinion, the available production time in claim 1 is met by, first, **t_b of (n) minus t_a of (n)** , correct?

A. At that instant, yes.

Q. Second, available production time in claim 1 in your opinion is met by **$t_{sub\ d}$ minus $t_{sub\ b}$** , as in boy, of (n) , correct?

A. Yes.

Q. And in your opinion, the available production time in claim 1 is met by, third, **$t_{sub\ d}$ of (n) minus $t_{sub\ capital\ T}$ of (n)** , correct?

A. Correct.

Q. **It's met by all of them?**

A. **Right.** Because the last two are subset of the first. So if the first time is available at this instance, then of course, the other times are available, too.

EX2015 (Reader), 153:23-154:15

Dr. Reader was unable to consistently explain which portion of Chou allegedly teaches the “available reproduction time.”

Dr. Reader's testimony directly contradicts his own testimony that the “claim requires” the “available time [to] reflect what is stored in the buffer” [EX2015, 53:17-20]



**DR. CLIFFORD
READER**

*Petitioner's
Expert*

- A. Because of what I explained. The fact is that the claim requires determining the code rate based on the available time, and Chou achieves that **with a subset of the potentially available time**, but he achieves it by using the target schedule as his method for managing the variability and the delivery rate.

EX2015 (Reader), 150:8-14

Peloton's counsel was aware of these inconsistencies

Peloton's counsel *read Dr. Reader his declaration back to him* repeatedly and through improper leading questions, Dr. Reader *re-adopted* his original positions



Q. And in the second half of paragraph 90, you mention, and I quote over here: "And based on an available reproduction time," and in double quotes you mention, ("buffer duration"), which is a time available for reproducing the content based on the content data stored in the storage device," and you mention, "(client's decoder buffer) of the reception device."

Do you see that?

A. Yes.

Q. What does the term "buffer duration" in paragraph 90 refer to?

EX2015 (Reader),187:19-202:11 (excerpts)

Q. Let's go to paragraph 91. In paragraph 91, first sentence you mention: "More specifically, Chou teaches an," quote, "available reproduction time," end quote, "in that the client of Chou has a client buffer and," quote, "the size of the client buffer can be expressed as a number of seconds of content in the buffer, called the buffer duration," end quote. And you cite to Exhibit 1004, paragraph 7.

Do you see that?

Q. And let's go to Chou publication and go to paragraph 67. Paragraph 67 is on page 8 of Chou, and if you see the last sentence of paragraph 67 on page 8, it reads: "Thus gap between a frame's arrival time and its playback deadline is the client buffer duration at the time of the frame arrival."

Do you see that?

Q. Let's go back to paragraph 91 again of your declaration, and paragraph 91 ends stating: "Accordingly, in Figure 5, the gap between the arrival schedule and the playback deadline is the buffer duration equivalent to the available reproduction time."

Do you see that?

Q. In Figure 5 of Chou, if you look at the straight line on the top, this is slope 1 over v and on the top it says the "playback deadline."

Do you see that?

Q. You see the quote in paragraph 91 of your declaration is from paragraph 7 of the Chou publication.

Do you see that?

Q. And then you cite to Exhibit 1004, which is Chou, and you also cite to paragraph 67 and paragraph 5.

Do you see that?

Q. Reading the last sentence on page 73, paragraph 153 of the declaration, it states: "This time is referred to by Chou as the client buffer duration, or simply buffer duration."

Do you see that?

A. Yes, I see that.

Q. And then you cite to Exhibit 1004, paragraph 62. Do you see that?

A. Yes, yes, yes.

Q. And next sentence on page 74, you quote from Chou on the top of the page.

Do you see that?

A. Yes, I see that.

Q. And the quote reads: "(The gap between a frame's arrival time and its playback deadline is the client buffer duration at the time of the frame arrival.)"

Do you see that?

A. Yes, I see that.

7

PELOTON'S SUR-SUR-REPLY ARGUMENTS ARE UNTIMELY

BAKER BOTTS



Section I of Petitioner’s sur-sur-reply is improper and should be disregarded

- The Board set limits in authorizing Petitioner’s Sur-Sur-Reply:

Petitioner is authorized to file a five-page sur-sur-reply, limited to addressing Patent Owner’s contentions in its Sur-reply that Petitioner’s Reply presented new theories and opinions and the accompanying supplemental declaration.

Oct. 9, 2024 Email from Trials@USPTO.GOV

- Section I of Petitioner’s sur-sur-reply includes argument wholly outside the scope of the limits set by the Board.

I. The Petition Demonstrated That Chou Satisfies Limitation 1(D)

NEC admits that its argument that Chou fails to disclose Limitation 1(d) hinges on construing “‘based on’ to mean ‘using as an input.’” Sur-reply (SR) 2, 5. But that narrowing construction fails. Reply, 2-5; D.I. 41. Peloton showed that Chou’s system dynamically adjusts code rate to control client buffer duration using feedback from the client to the server. Chou, ¶¶19, 81. Under Limitation 1(d), this entails determining code rate based on client buffer duration, which is the difference between play arrival time t_p . Reply, 6-9; Pet. 34-39. NEC dismisses Chou’s disclosure in ¶19 as referring to *prior* systems, and maintains Chou teaches away from Limitation 1(d), SR 8-9, but that ignores Chou’s express disclosure that “client buffer management is a *key element* affecting the performance,” and that “*the present system* and process [entails] *controlling the size of the client buffer* over time.” Chou, ¶20.

Peloton further demonstrated Chou also determines code rate based on “remaining time.” Reply, 18-20; Pet. 37. NEC does not dispute Peloton’s identified “remaining time,” but instead proffers an overly narrow construction to argue that Chou’s code rate determination is not based on remaining time. See SR 21-23.

I. The Petition Demonstrated That Chou Satisfies Limitation 1(D)

Section III of Petitioner’s sur-sur-reply is improper and should be disregarded

- The Board set limits in authorizing Petitioner’s Sur-Sur-Reply:

Petitioner is authorized to file a five-page sur-sur-reply, limited to addressing Patent Owner’s contentions in its Sur-reply that Petitioner’s Reply presented new theories and opinions and the accompanying supplemental declaration.

Oct. 9, 2024 Email from Trials@USPTO.GOV

- Section III of Petitioner’s sur-sur-reply includes argument wholly outside the scope of the limits set by the Board.

III.	NEC’s “Encoder Parameters” Theory of Chou Fails for Other Reasons.....	3
A.	Chou Uses “Encoder Parameters” <i>During Startup</i> , But Determines Code Rate Based on Decoder Status Thereafter.....	3
B.	Chou Does Not Use “g ^{new} (n)” to Determine Code Rate	4
C.	Chou’s Encoder <i>and</i> Decoder Both Simulate Leaky Bucket Models, and Their Buffers Each Have Their Own “Gaps”	4

Peloton's sur-sur-reply Sections I and III arguments are untimely and should be ignored

Even if considered, the arguments comprise only attorney argument unsupported by evidence and fail on the merits because they still do not show that $g(n-1)$ can satisfy the "available time" limitation.

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