

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

HANSHOW AMERICA INC. and HANSHOW TECHNOLOGY CO., LTD.
Petitioner,

v.

SES-IMAGOTAG GMBH,
Patent Owner.

Case No. IPR2024-00188
U.S. Patent No. 11,405,669

DECLARATION OF JOHN HART, PH.D.

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EXHIBIT LIST

Exhibit	Reference
2001	Andrew S. Tanenbaum & David J. Wetherall, Computer Net-works (Prentice Hall, 5th ed. 2011)
2002	Deposition Transcript of Dr. Emmanouil M. Tentzeris
2003	Unicast UDP Usage Guidelines for Application Designers, RFC 5405, Networking Working Group (“RFC 5405”)
2005	Curriculum Vitae of John Hart, Ph.D.

LISTING OF CHALLENGED CLAIMS

Reference	Claim limitation
[1.0]	A video playback system (1), comprising
[1.1]	a number of playback devices (6A, 6B) to playback a video on their screens (5),
[1.2]	each playback device (6A, 6B) comprises a memory to store video data (9) representing said video,
[1.3a]	and a communication stage to communicate data with each other, wherein the devices (6A, 6B) are designed:
[1.3b]	to transmit video playback progress-data via the communication stage to the other device (6B, 6A); and,
[1.3c]	to determine based on the received progress data whether it is in a synchronous or asynchronous playback progress with the other devices (6B, 6A);
[1.4]	wherein the display devices (6A, 6B) are designed to display product information or product price related information by means of virtual electronic shelf labels displayed within a section of a screen's (5) display area overlapping with a video content or substituting a video content of said section.
[2.0]	The system (I) ¹ according to claim 1,
[2.1]	comprising a video distribution server (7) for distribution of the video data (9) to the devices (6A, 6B), in particular the entire video data (9) of a video upfront to playback start at the devices (6A, 6B).
[3.0]	The system (1) according to claim 1,
[3.1]	wherein the devices (6A, 6B) are designed to determine independently from a video distribution server (7) which distributed the video data (9) to the devices (6A, 6B) that they are in a synchronous or asynchronous playback progress.
[4.0]	The system (1) according to claim 1,

¹ I understand that Patent Owner notes this dependently-claimed element reflects a typographical error in the patent language; the “system (I)” identified by Roman numeral refers to the same “system (1)” identified by Western Arabic numeral in independent claim limitation [1.0].

[4.1]	wherein the devices (6A, 6B) are designed: to playback compressed video data (9) that are structured in frames labeled by frame numbers, and to utilize a frame number that labels the frame that is currently played back as the progress-data to be transmitted.
[5.0]	The system (I) ² according to claim 4,
[5.1]	wherein each device (6A, 6B) is designed to compare a frame number received with a frame number of the frame currently played back at the device (6A, 6B) and to determine an asynchronous playback progress if the difference in the frame numbers compared with each other exceeds a pre-determined threshold value.
[6.0]	The system (1) according to claim 1,
[6.1]	wherein each device (6A, 6B) is designed to repeatedly transmit the progress-data, preferred in a periodic manner, more preferred every second.
[7.0]	The system (1) according to claim 1,
[7.1]	wherein each device is designed to broadcast adjustment data for adjusting the playback progress of the devices (6A, 6B) over its communication stage if it detects an asynchronous playback progress.
[8.0]	The system (1) according to claim 7,
[8.1]	wherein each device (6A, 6B) is designed to embed the adjustment data in a synchronization command.
[9.0]	The system (1) according to claim 8,
[9.1]	wherein each device (6A, 6B) is designed to receive the adjustment data and to adjust its playback progress according to the adjustment data, in particular to continue its playback of compressed video data that are structured in frames labeled by frame numbers with the frame number received in the broadcast of the adjustment data.
[10.0]	The system (1) according to claim 7,
[10.1]	wherein each device (6A, 6B) is designed: to receive the adjustment data; and to adjust its playback progress according to the adjustment data, in particular to continue its playback of compressed video data that are structured in frames labeled by frame numbers with the frame number received in the broadcast of the adjustment data.
[11.0]	The system (1) according to claim 1,
[11.1]	wherein the communication stage is designed to use UDP multicast

² See *supra* note 1.

	data packets for the communication.
[12.0]	The system (1) according to claim 1,
[12.1]	wherein each display device (6A, 6B): comprises its screen (5) or a number of screens (5), or is connected to its external screen (5) or a number of screens (5) to be controlled by it.
[13.0]	The system (1) according to claim 1,
[13.1]	wherein said screen (5) is designed to realize a shelf rail (4) or part of it, or to cover a front of a shelf rail (4) or a part of it to which it is attachable.
[14.0]	The system (1) according to claim 1,
[14.1]	wherein the system realizes a video playback enabled electronic shelf label system.
[15.0]	A use of the system (1) according to claim 1 as video playback enabled electronic shelf label system for the playback of synchronized video content for a number of shelf rails (4),
[15.1]	wherein each of said shelves rails (4) is realized by a screen (5) or carries a screen (5).

I, Dr. John C. Hart, declare as follows:

I. INTRODUCTION

1. I have been retained by counsel for Patent Owner VusionGroup SA, (“Patent Owner” or “Vusion”) as an independent expert consultant in this proceeding in connection with *inter partes* review (IPR) proceeding IPR 2024-00188 concerning U.S. Patent 11,405,669 (“’669 Patent”) (Ex. 1001), pending before the U.S. Patent and Trademark Office, Patent Trial and Appeal Board (“Board”).

2. I have been asked to opine on whether the Challenged Claims of the ’669 Patent are rendered obvious by the prior art. Along with my years of education, research, and experience, my opinions are based on investigation and study of relevant materials. The materials that I evaluated in support of this Declaration include all exhibits cited in this Declaration and in the Petition.

3. I may rely upon these materials, my knowledge and experience, and/or additional materials to rebut arguments raised by the Petitioner. Further, I may also consider additional documents and information in forming any necessary opinions, including documents that may not yet have been provided to me.

4. My analysis of the materials produced in this matter is ongoing, and I will continue to review any new material as it is provided. This Declaration represents only those opinions I have formed to date. I reserve the right to revise,

supplement, and/or amend my opinions stated herein based on new information and on my continuing analysis of the materials already provided.

5. My work in this case is being billed at my normal hourly consulting rate, with reimbursement for actual expenses, through IMS Legal Strategies. My compensation is not related to the outcome of this proceeding. I have no personal interest in the outcome of the case.

II. BACKGROUND AND QUALIFICATIONS

6. My qualifications for forming the opinions set forth in this Declaration are summarized here and explained in more detail in my attached curriculum vitae.

7. I received my B.S. in Computer Science from Aurora University in 1987. I received my M.S. and Ph.D. in Electrical Engineering and Computer Science from the University of Illinois at Chicago in 1989 and 1991, respectively.

8. I am a tenured full Professor of Computer Science in the Siebel School of Computing and Data Science at the University of Illinois at Urbana-Champaign, a program consistently ranked in the top five by U.S. News & World Report. As an educator for the past three decades, I have taught courses to thousands of students on a variety of topics in visual computing, including computer graphics, data visualization, virtual reality and multimedia systems. I also strive to provide opportunities for the general public to learn more about visual computing. For example, in 1999 I oversaw the production of the documentary “The Story of Computer

Graphics.” I also teach an open course on data visualization on Coursera that has reached over 360,000 learners worldwide.

9. I have over 35 years of research experience in the field of visual computing, including multimedia systems, with over a hundred papers, videos, patents and other contributions. This research has been funded by Adobe, Intel, Microsoft, Nokia, and Nvidia as well as the National Science Foundation (NSF) and the Defense Advanced Research Projects Agency (DARPA).

10. I am an internationally recognized leader in the field of visual computing. The Association for Computing Machinery (ACM) is the main worldwide organization for computing professionals. From 1994 to 1999, I served on the executive committee of the ACM Special Interest Group on Computer Graphics and Interactive Techniques (SIGGRAPH). From 2002 to 2008, I was the Editor-in-Chief of the ACM Transactions on Computer Graphics. From 2014 to 2022, I was a founding member of the editorial board of ACM Books and served as its area editor for visual computing.

11. This report is on the subject of multimedia systems for synchronizing the display of video. I have worked on a variety of methods and multimedia systems for the processing and display of video. This work has included multimedia systems for cloud gaming, where remote servers generate interactive video that is transmitted

over the internet to a user's console. Such work has been peer reviewed, accepted, presented and published by the top multimedia conferences.

12. One such contribution is “High-Quality Zero-Delay Remote Rendering System for 3D Video,” which was published in the Proceedings of the 18th ACM International Conference on Multimedia in 2010. This contribution advanced the state-of-the-art in remote rendering. In a remote rendering system, a user controls a 3-D graphics application (e.g., a videogame) locally, but the rendering process, which creates a new depiction of the 3-D scene based on the user's interactions, occurs remotely. The user utilizes a local device (e.g., a smartphone) that transmits an interaction (e.g., a joystick move or a button press) to a remote render server. The remote render server creates new video images of the 3-D scene based on the received interactions and transmits the resulting video images back to the user's device. Synchronizing the server's video stream with the user's device was imperative, as the point of the paper was to “design a 3D video remote rendering system that significantly reduces the delay while maintaining high rendering quality.” SHU SHI ET AL., HIGH-QUALITY LOW-DELAY REMOTE RENDERING SYSTEM FOR 3D VIDEO, Abstract (18th ACM International Conference on Multimedia 2010).

13. Another such contribution is “Optimizing Next-Generation Cloud Gaming Platforms with Planar Map Streaming and Distributed Rendering,” which was published by the IEEE in the Proceedings of the 15th Annual Workshop on

Network and Systems Support for Games. This contribution also advanced the state-of-the-art in remote rendering, by using a “planar map” to decompose the 3-D scene rendered into a video image into two components. One of these components was rendered on a remote render server generating a video image. The other component was rendered locally on the user’s device. The system would then coordinate these two processes, running on two different computational devices connected by a network, to ensure that the two video streams were synchronized and could be merged into a single video stream displayed on the client device.

14. This work was built on prior work on hybrid streaming approaches. “Cloud gaming platforms [] can be roughly divided into three groups []: (i) video, (ii) graphics, and (iii) hybrid streaming. Video streaming refers to gaming platforms in which each frame is rendered completely on the server, ... for transmission to the client. Graphics streaming describes transmission of game scene data and/or rendering commands of each frame from server to client. Hybrid streaming as implied by the name refers to some clever combination of the above technologies. In this paper, we explore a new graphics streaming approach using planar maps for cloud gaming.” (Optimizing Next-Generation Cloud Gaming Platforms with Planar Map Streaming and Distributed Rendering, at Sec. II).

15. I have also worked on the synchronization of multiple video streams across networks between multiple clients for applications in virtual reality.

16. In 1992, I wrote the seminal VR paper “The CAVE: Audio Visual Experience Automatic Virtual Environment,” published in the 35th volume of Communications of the Association of Computing Machinery on pages 64-72. This paper introduced a new VR display configured as a room where walls, and possibly the ceiling and floor, consist of projection screens, each displaying two (left-eye/right-eye stereo) video streams of a 3-D virtual environment depicted from the position of a viewer in the room. One of the many challenges of such a VR display room was the synchronization of these video streams across multiple clients. “Real-time rendering of the virtual work is achieved through six Silicon Graphics Inc. VGX workstations, each attached to a rear projection display. A Silicon Graphics ‘Personal Iris’ serves as a master controller for the system and all workstations communicate via Ethernet. ... Multiscreen stereo requires synchronizing the video signals.” CAROLINA CRUZ-NEIRA ET AL., THE CAVE: AUDIO VISUAL EXPERIENCE AUTOMATIC VIRTUAL ENVIRONMENT 71 (Communications of the Association of Computing Machinery 1992).

17. I am currently advising a Ph.D. student working with a pathologist at the Mayo Clinic on a single server multiple-client VR rendering system that provides synchronized video images to multiple VR clients. This work relies on a single render server that generates multiple synchronized video image renderings of the same scene from multiple viewpoints, such that multiple remote networked clients, each

with a VR device receiving and displaying the video images appropriate for their unique viewpoint, can observe and collaborate on a single shared 3-D medical dataset.

III. MATERIALS CONSIDERED

18. The opinions included in this declaration are based on the documents I reviewed, my professional judgment, and my education and experience.

19. In forming my opinion expressed in this declaration, I reviewed the following materials:

- the '669 patent (Ex. 1001);
- the prosecution history of the '669 patent (Ex. 1002);
- The Petition for *inter partes* review filed by Petitioner;
- The declaration of Petitioner's expert, Dr. Manos M. Tentzeris (Ex. 1003);
- The transcript of the deposition of Dr. Tentzeris (Ex. 2002);
- The references Petitioner's Grounds rely upon, including:
 - U.S. Patent Application Publication 2016/0134930 A1 ("Swafford") (Ex. 1004),
 - U.S. Patent Application Publication 2017/0134690 A1 ("Masumoto") (Ex. 1005),

- U.S. Patent Application Publication 2017/0171577A1 (“Kipp”) (Ex. 1006),
- Japanese Unexamined Patent Application Publication 2011-76222A (Ex. 1007),
- Certified Translation of Japanese Unexamined Patent Application Publication 2011-76222A (“Takashi”) (Ex. 1008),
- International Application Published under the Patent Cooperation Treaty 2008/073829 A2 (“Clontz”) (Ex. 1009),
- U.S. Patent Application Publication 2018/0035018 A1 (“Yamada”) (Ex. 1010);
- The Patent Owner’s Preliminary Response;
- The Petitioner’s Preliminary Reply;
- The Patent Owner’s Preliminary Sur-Reply to Petitioner’s Preliminary Reply;
- The Board’s decision instituting trial in this proceeding;
- ANDREW S. TANENBAUM & DAVID J. WETHERALL, *COMPUTER NETWORKS* (Prentice Hall, 5th ed. 2011) (Ex. 2001)
- *Unicast UDP Usage Guidelines for Application Designers*, RFC 5405, Networking Working Group (“RFC 5405”) (Ex. 2003)

and any other material I refer to in this declaration in support of my opinion.

IV. SUMMARY OF OPINIONS

20. For the reasons discussed below, the asserted claims of the '669 Patent are not rendered obvious by any combination of prior art asserted in the Petition.

V. BACKGROUND

A. Overview of the Technology

21. In traditional brick-and-mortar retail, products are displayed on shelves, and paper or sticker labels are placed on the shelf's "rail"—the consumer-facing part of the shelf—to identify information like name, quantity, or price of the products. But as low-powered microelectronics have become more common, stores have begun transitioning to electronic shelf labels ("ESLs"), or even larger digital displays installed on shelf rails that can depict "virtual" shelf labels. Ex. 1001, 1:55-60, 4:44-48. "Given the fact that in a large retail store a huge number of shelf rails may exist, it is of utmost economic benefit to utilize inexpensive hardware for the installation of such video playback enabled electronic shelf labels throughout the entire store." *Id.*, 4:44-48. Unlike paper or sticker labels, ESLs and larger displays (which the '669 Patent collectively calls "display devices" or "playback devices") can present dynamic video and images. Moreover, these display devices can be configured so that multiple display devices can show one image or video extended (i.e., stretched) across multiple display devices.

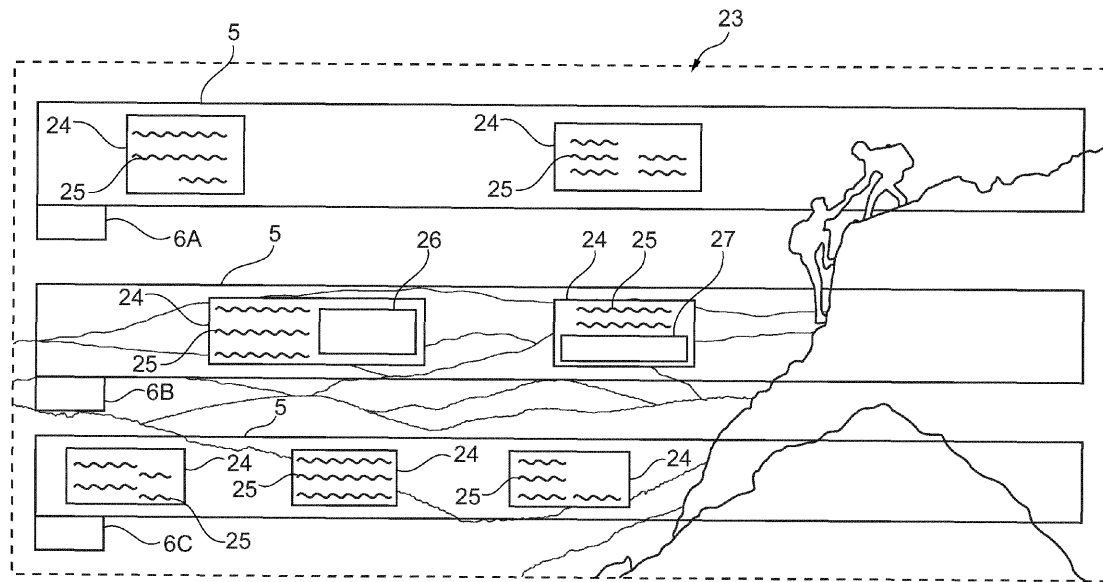


Fig. 6

Ex. 1001, Fig. 6.

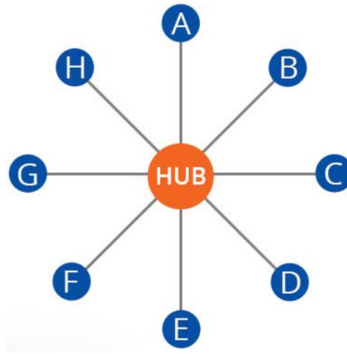
22. As shown in the '669 patent's Fig. 6 reproduced above, different subsets of a video image 23 can be displayed on different display screens (with the three wide rectangles labeled 5). The top screen shows a mountain climber pulling up another, whose head and arm are only visible. The middle screen shows the lower leg of the second climber and the receding skyline. The lower screen shows only terrain features. Even though these screens do not overlap each other, such that portions of the video image are not displayed in the gaps between the displayed portions of the image, a viewer would still understand these three display screens to be displaying subsets of the same video image, similar to three windows opening up to the same view of the outdoor landscape. Extending the video or image on multiple display

devices, however, requires that the devices be “synchronized” so that they all show their respective part of a video or image at the same time. *Id.*

23. A generic example of a video extended across four different displays is provided below.



24. Prior to the '669 Patent, ESLs utilized a hub-and-spoke model to synchronize video. In such systems, a central “hub” (e.g., a central server) communicated with each “spoke” (e.g., each ESL or display device) to ensure synchronization.



But hub-and-spoke systems required expensive implementation hardware, had high bandwidth requirements, and relied on precise server-synchronized clock signals to ensure the server-streamed video buffers correctly. Ex. 1001, 1:20-36. In such systems, a single video source (HUB) would ensure synchronization by streaming video to each display (A-H). The displays would decode and render the video as soon as it was received, and since the same video was being transmitted to all displays, the displays would remain synchronized to the source (HUB). These prior systems had significant drawbacks, including expensive implementation hardware, high bandwidth requirements, and reliance on precise server-synchronized clock signals to ensure the server-streamed video buffers correctly. *Id.* At the time, “[t]he known system show[ed] the drawback that it require[d] high bandwidth for the just in time distribution of the video content to the video playback devices.” *Id.*, 1:28-30. “Further to this, fast and therefore expensive hardware of the playback devices [was] required to receive the streamed video, buffering it and to synchronously playback the video content on the individual playback devices in accordance to the timing

determined either by the timing signal delivered by the server or the system wide synchronized clock signal.” *Id.*, 1:30-36. These video signals were constantly transmitted from the hub to the spokes, even if the video was a loop of the same short clip. Thus, the network had to support enough bandwidth for constant video transmission, which increased the price, materials, power, and other platform resources.

25. In retail stores, goods are displayed on shelves; the front of the shelves (i.e., rails) may include labels displaying information about the goods (e.g., price). For example, I find that a grocery store shelf containing eggs might include a label on the shelf rail identifying the brand of eggs, the number of eggs in each carton, and the price of each carton. If the store decides to instead display cheese in this location, the existing label for eggs on the shelf rail would be replaced with a new label providing information about the cheese now in that location. Electronic shelf label systems are used in place of traditional shelf labels in retail stores. Ex. 1001, 4:44-48. Electronic shelf labels display the information traditionally printed on paper labels and can be updated automatically. They can also display advertising through images and video to enhance the shopping experience. But this requires synchronizing the display of the electronic shelf labels. At the time of the ’669 Patent invention, existing playback systems used a hub-and-spoke type system to synchronize video. Such systems streamed “just in time” video to devices and synchronized the playback of that video using a “highly precise and system wide timing signal” from the

server or “synchronized clock signal” from “within the playback devices.” *Id.*, 1:20-36.

B. Overview of the '669 Patent

26. Based on my review, rather than have the display devices communicate through a hub as in the prior art systems, I found that the '669 Patent synchronizes video by having the display devices communicate directly with one another. Ex. 1001, 1:44-60, 1:66-2:11. Thus, “[n]o super-efficient and expensive hardware is required to achieve this, which is of particular importance for the targeted use case of the video playback system for synchronized shelf rail video playback.” *Id.*, 2:2-5. Videos are just a series of pictures (often called “frames”) played in rapid succession. Whereas prior art systems relied on a centralized system to determine playback device synchronicity, the '669 Patent describes that each device does this based on the playback progress data received from all the other devices. As indicated by the '669 Patent, “each device [is] designed to compare a frame number received” from another device “with a frame number of the frame currently played back at the device and to determine an asynchronous playback progress if the difference in the frame numbers compared with each other exceeds a pre-determined threshold value.” Ex. 1001, 2:54-59.

27. By enabling synchronization through bidirectional, specifically reciprocal, communication between the displays themselves, the displays could more

efficiently download all or large portions of the video from the source, and display the synchronized video independently from the source, without relying on a constant stream of video coming from the source. This would reduce the communication bandwidth required for the network, as well as the processing and power needs of the displays.

28. The '669 Patent discloses that, after a video has been downloaded from a central server (7) and begins playing back on different display devices (6A, 6B), each display device checks which frame number it is displaying at given intervals (e.g., one second), and broadcasts its frame number to the other display devices. This “playback progress-data” is used as the basis for each display receiving the information to determine whether it is synchronized with the other displays. Ex. 1001, 5:49-55. In other words, playback device 6A compares its current frame to the playback progress data received from playback device 6B (and other playback devices in the system), and playback device 6B compares its current frame to the playback progress data received from playback device 6A (and other playback devices in the system).

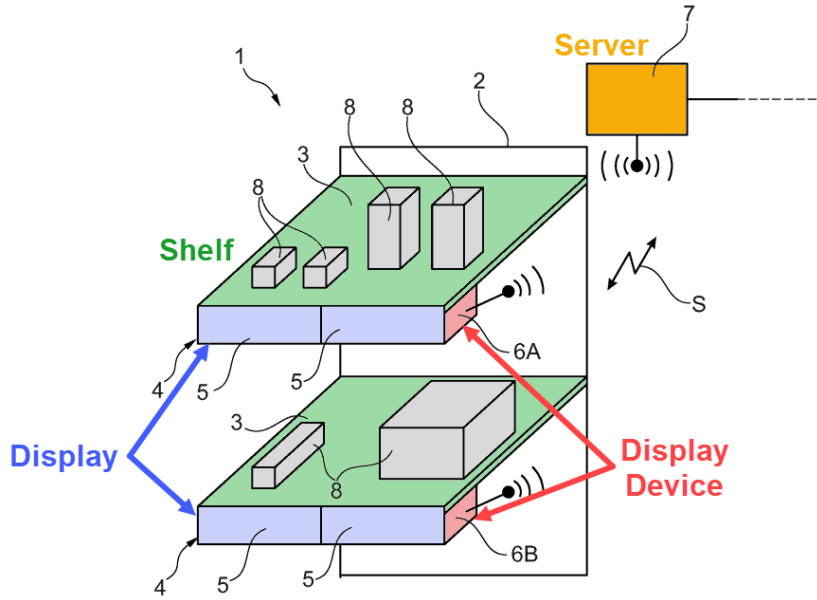


Fig. 1

Ex.1001, Fig. 1 (annotated)³

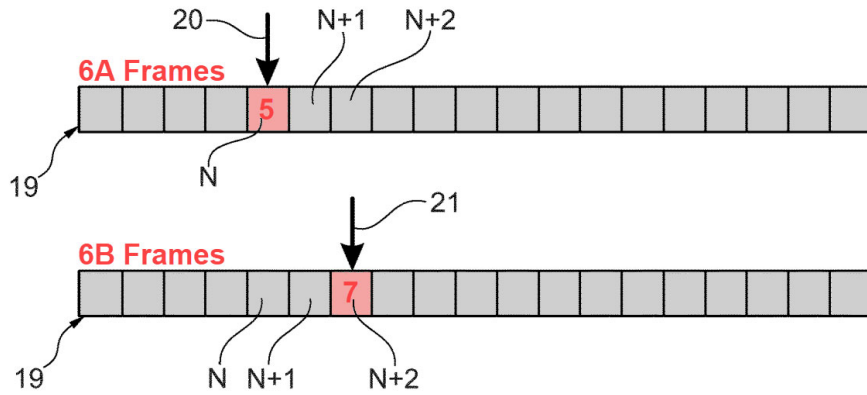


Fig. 4

Ex.1001, Fig. 4 (annotated)

³ Annotated images in this declaration were developed with the assistance of counsel.

29. Fig. 4 shows an example of this. I find that in Fig. 4 after one second of playback, display device 6A informs display device 6B that it (6A) is on frame 5 of the video, and 6B informs 6A that it (6B) is on frame 7. Each display device compares the received frame number to its own frame number at the given interval. Ex. 1001, 5:56-58. If the received frame number and a display device's own frame number differ by two or more frames, the display device that first recognized the asynchronization will broadcast a command for nearby display devices to resynchronize by jumping ahead to match the higher frame number. Ex. 1001, 5:59-65. In the example of Fig. 4, in my opinion, if 6B (which is at frame 7) discovers the asynchronization first, it instructs 6A to jump to frame 7 to resynchronize.

30. Therefore, based on my review, the '669 Patent describes how the playback devices are designed to determine whether their video playback is synchronized (the claimed "synchronous or asynchronous playback progress") with other devices in a manner that is fundamentally different from the prior art. *Id.*, Abstract. Each of playback devices 6A and 6B "attend[s] the lapse of ... its own clock" and "transmit[s]" its own "playback progress-data, which represent[s] the frame number of the correctly used frame in the respective device 6A, 6B" after the lapse has passed. *Id.*, 5:49-53. Importantly, the '669 Patent describes this exchange as mutual, explaining that "transmission of the playback progress-data of the device 6A is received at the device 6B and vice versa." *Id.*, 5:53-55. Each of the devices then "compare[s]

the received frame number with the frame number currently in use in its *own* playback process” to determine whether the frames, and thus the playback, are in sync (for example, whether “a difference [in playback] of more than 2 frames” exists). *Id.*, 5:56-63 (emphasis added). If, for example, device 6A detects “asynchronous playback progress” first, it sends out a “synchronization command” that “defines the frame number at which playback shall continue” to the other devices. *Id.*, 3:43-50, 6:14-16. The synchronization command “instructs” the other devices to resume playback at the defined frame number. *Id.*, 3:43-50.

31. In an exemplary system disclosed in the ’669 Patent, the system initially communicates a video from server 7 to paired playback devices 6A, 6B installed on retail shop shelf rails 4. *Id.*, 5:32-36. “The video content (film) to be displayed on the screens 5 is supplied by a server 7 via a radio signal to both devices 6A and 6B.” *Id.*, 5:32-34. “The video content is delivered in [the] form of compressed video data that are structured in frames labeled by frame numbers.” *Id.*, 5:34-36. Each of 6A and 6B contains their own memory, video screens 5, and a “communication stage.”

32. In an exemplary system, playback devices 6A and 6B download video from the server over a communication channel, then cease communications with the server and repurpose the communication channel for communicating playback progress data between playback devices (e.g., 6A and 6B). *Id.*, 2:22-33. “Advantageously, after download of the video data is completed, the communication

channel/medium used for downloading the video data to the device is fully available for the communication of the devices with each other.” *Id.*, 2:22-25. Based on the progress data received from the other playback devices, each playback device “independently” determines “that they are in a synchronous or asynchronous playback progress” with other playback devices. *Id.*, 5:53-55; 8:29-33. “[D]evices (6A, 6B) are designed to determine independently from a video distribution server (7) which distributed the video data (9) to the devices (6A, 6B) that they are in a synchronous or asynchronous playback progress.” *Id.*, 8:29-33. In other words, playback device 6A transmits its playback progress data, which is received by playback device 6B “and vice versa” (playback device 6B transmits its playback progress data, which is received by playback device 6A). *Id.*, 5:53-55. “The transmission of the playback progress-data of the device 6A is received at the device 6B and vice versa.” *Id.*

33. In the configuration described in the ’669 patent, neither networked device 6A or 6B is the “hub” (sometimes referred to as a “master”), and importantly, *each* is responsible *both* for transmitting its playback progress data to the other displays and for determining synchronization. This topology resembles what a POSITA would have understood to be a peer-to-peer network. These peer-to-peer networks consist of a plurality of devices, each communicating directly with each other, eliminating the need for a central “hub” or “master.” Such networks were popularized by the Napster music file sharing service established in 1999. Peer-to-peer networking

for file sharing was used for the process of distributing large files across multiple networked computers, where the file would be available for later download upon user request. I am not aware, nor would a POSITA have been aware, of any application of peer-to-peer networking to synchronize multiple video streaming before the priority date of the '669 Patent of November 10, 2017.

C. Prosecution History of the '669 Patent

34. I have reviewed the prosecution history of the '669 Patent, as included as Exhibit 1002.

35. The '669 Patent was filed as Application No. 16/762,709 ("709 Application") on May 8, 2020, and claims priority to PCT/EP2017/078844 filed on November 10, 2017. Ex. 1001, Cover. On the same day applicant filed the '709 Application, the applicant filed a preliminary amendment that included 16 claims. Ex. 1002, 279-86. The correspondence between the issued claim numbers and the claim numbers during prosecution is as follows:

Issued Claim No.	Claim No. During Prosecution
1	17
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	16
10	9
11	10

Issued Claim No.	Claim No. During Prosecution
12	11
13	12
14	13
15	15
N/A	1 (included all limitations of issued claims except limitation [1.4])
N/A	14 (including the substance of limitation [1.4])

See Ex. 1002, 25.

36. Claim 1 during prosecution contained the same limitations as issued claim 1 with the exception that it did not include limitation [1.4]’s requirement that the display devices “are designed to display product information or product price related information by means of virtual electronic shelf labels” and that such display would be “overlapping with” or “substituting” for video content. *Id.*, 283. The substance of limitation [1.4] was included in original claim 14. The limitations of claim 1 and claim 14 during prosecution are reproduced below.

[Original Claim 1]

[1.0] A video playback system (1), comprising

[1.1] a number of playback devices (6A, 6B) to playback a video on their screens (5),

[1.2] each playback device (6A, 6B) comprises a memory to store video data (9) representing said video,

[1.3a] and a communication stage to communicate data with each other, wherein the devices (6A, 6B) are designed[:]

[1.3b] to transmit video playback progress-data via the communication stage to the other device (6B, 6A)[;] and[,]

[1.3c] to determine based on the received progress data whether it is in a synchronous or asynchronous playback progress with the other devices (6B, 6A).

Ex. 1002, 281.

[Original Claim 14]

The system (1) according to claim 1, wherein the display devices (6A, 6B) are designed to display product information or product price related information by means of virtual electronic shelf labels displayed within a section of a screen's (5) display area overlapping with a video content or substitution a video content of said section.

Id., 283.

37. The '669 Patent issued after several rounds of substantive prior-art rejections. The following discussion refers to the claims by their numbers during prosecution unless otherwise noted.

38. On 06/16/2021, the Examiner issued a Non-Final Office Action rejecting claims 1-9 and 11-16 as anticipated by Asami (EP2461582) and claim 10 as rendered obvious by Asami. Ex. 1002, 145-54.

39. On 09/13/2021, Applicant responded to the Non-Final Office Action and traversed the rejections without amending the claims. *Id.*, 136-44. As to claim 1, Applicant argued that “[e]ach playback device ... comprises a communication stage *to communicate data with each other*, wherein the devices are designed to transmit video playback progress data *via the communication stage to the other device* and to determine, based on the received progress data, whether it is in a synchronous or asynchronous playback progress with the other devices (*emphasis added*).” *Id.*, 140-41. Applicant further explained that the emphasized language “has the technical effect that that each individual playback device can independently detect an asynchronous playback progress within the group of playback devices,” which the individual playback devices achieve “by a simple and fast comparison of the playback progress of another device or of other devices with its own playback progress.” *Id.*, 141. “In the words of claim 1, a simple and fast comparison of the playback progress of the devices can be achieved by [the devices] communicating ‘*with each other*.’” *Id.* (emphasis in original). Applicant noted that “[w]ith each other’ particularly describes a **bidirectional** relationship (*cf.* Merriam-Webster

dictionary, definition for ‘*Each other*’: ‘*each of two or more in reciprocal action or relation*’).” *Id.*, 141 (bold emphasis added).

40. Applicant then traversed Asami, arguing that it “does not disclose that the communication stage [in each device] is used *to communicate data with each other*, wherein the devices are designed to transmit video playback progress-data *via the communication stage to the other device* and to determine based on the received progress data whether it is in a synchronous or asynchronous playback progress *with the other devices*.” *Id.* (emphasis in original). Instead, Asami disclosed “first playback device(s)” (first image reproduction devices 10(a...e)) and a “second playback device” (second image reproduction device 20). *Id.* Applicant explained that the first and second playback devices are not the same, as “[only] the second playback device 20 further comprises: a synchronization information transmitting part 251 for transmitting synchronization information including information [. . .] of said second playback device 20 to said first image reproduction device by *unidirectional* communication (*emphasis added*).” *Id.*

41. Thus, “in contrast to the present independent claim 1, wherein different ones of the ... playback devices communicate *with each other bidirectionally*, thereby enabling *independent* detection of an asynchronous playback progress within the group of playback devices, in *Asami*, different ones of the first playback devices 10 can only detect an asynchronous playback progress *dependent* from the

second playback device 20 (*emphasis added*).” *Id.* (bold emphasis added); *see also id.*, 142-43 (“[S]ince *Asami* teaches that different ones of the first playback devices 10 can only detect an asynchronous playback progress *dependent* from the second playback device 20 by unidirectional communication, the skilled person would not get any hints towards providing the system of claim 1 with playback devices comprising a **bidirectional** communication stage *to communicate data with each other (emphasis added)*.”) (bold emphasis added).

42. Applicant further explained that “[d]escriptively speaking, the playback devices of *Asami* work according to the master-and-slave principle, wherein the second playback device 20 would be the master, and all first playback devices 10 would be the slave(s).” *Id.*, 141. Thus, “a simple and fast comparison of the playback progress of another first playback device or of other first playback devices with its own playback progress cannot be achieved for individual ones of the number of first playback devices.” *Id.*, 141-42 (emphasis in original).

43. Thus, it is my view that Applicant’s arguments underscored that the plain language of claim 1 requires playback devices that are designed to transmit playback progress-data to each other in a “bidirectional,” and specifically a “reciprocal,” exchange. Further, because the devices exchange playback progress-data, each claimed device is further designed to make an independent determination of

whether it is in synchronous or asynchronous playback progress with the other device (or devices) that has/have transmitted playback progress-data to the device.

44. To summarize, in contrast to then-pending claim 1, Applicant argued that Asami (just like Masumoto) disclosed a system in which first playback devices and a second playback device engaged in neither a “bidirectional” nor a “reciprocal” exchange of playback progress data that allowed each of the playback devices to make an independent determination of its synchronization status with other devices. Instead, in Asami, the second playback device controls the synchronization of the first playback devices by transmitting synchronization information to all of the first playback devices, making the first playback devices’ determination of synchronization with other devices entirely dependent on synchronization information sent by the second playback device (and not playback progress data sent by the second playback device).

45. On 10/26/2021, during an Examiner-initiated interview, the Examiner suggested incorporating the subject matter of dependent claim 14 into the independent claim to place the application into condition for allowance. *Id.*, 132. However, no agreement was reached. *Id.*

46. On 11/17/2021, the Examiner issued a Non-Final Office Action. The Examiner found Applicant’s arguments “persuasive,” but entered a new ground of rejection: Asami and Oh (US2017/0098431). *Id.*, 114-15. The Examiner specifically

relied on Oh as teaching “to determine based on the received progress-data whether it is in a synchronous or asynchronous playback process with other devices.” *Id.*, 116-17.

47. On 2/16/2022, Applicant responded to the Non-Final Office Action, traversing the rejections as to the originally-filed claims, but also adding new claim 17 (which later issued as claim 1). *Id.*, 108. As the Examiner suggested, claim 17 combined subject matter from claims 1 and 14. *Id.* As to claim 1, Applicant reiterated that “Asami only teaches unidirectional communication from the management device 20 to the playback devices 10.” *Id.*, 109 (emphasis in original). Applicant again explained that “[d]escriptively speaking, the playback devices of *Asami* work according to the master-and-slave principle, wherein the second playback device 20 would be the master, and all first playback devices 10 would be the slave(s).” *Id.*; *see also id.*, 110 (explaining that the system of claim 1 requires “playback devices comprising a bidirectional communication stage *to determine based on the received progress-data whether [they are] in a synchronous or asynchronous playback progress with the other devices (emphasis added)...*”).

48. The Examiner issued a Final Office Action on 3/17/2022. The Examiner allowed claim 17 but continued to reject the other pending claims as obvious. *Id.*, 61-72. As to Asami, the Examiner disagreed with Applicant’s “argu[ment] that Asami only teaches . . . unidirectional communication from the management device

to the playback devices 10.” *Id.*, 63. Instead, Examiner noted that Asami “teaches that in cascade mode, there is bidirectional communication (*See* [0058] and [0063]-[0064]).” *Id.*

49. The Examiner never reconciled that Asami taught only a single device capable of making synchronization determinations. Specifically, based on my review, the Examiner appears to have focused on the fact that the first and second playback devices in Asami could communicate bidirectionally. However, as I explain above, Applicant’s argument regarding Asami—best understood in the context of the 09/13/2021 Response to Office Action—was that it disclosed a system in which first playback devices and the second playback device engaged in neither a “bidirectional” nor a “reciprocal” exchange of playback progress data that allowed each of the playback devices to make an independent determination of its synchronization status with other devices. Regardless, I believe that Applicant’s basic point regarding then-pending claim 1 (and therefore issued claim 1) remains the same—i.e., it requires devices designed to perform a “bidirectional,” and a specifically “reciprocal” exchange of playback progress data between playback devices so that each device could independently determine synchronization.

50. On 4/11/2022, Applicant filed a reply and amendment, canceling pending independent claim 1 and pending dependent claim 14 “to advance prosecution”

and amending the other pending claims to depend directly or indirectly from allowable claim 17. *Id.*, 55-59.

51. On 4/27/2022, the Examiner issued a Notice of Allowance. *Id.*, 12-16. In the Notice of Allowance, the Examiner stated that the “[p]rior art of record fails to teach or reasonably suggest where each playback device transmits the playback progress data to the other device to determine whether the device is synchronous or asynchronous with the other device where the product information is displayed as virtual shelf labels within a section of a screen[’]s display area overlapping with video content or substituting a video content of a section of the screen, when taking the claim as a whole.” *Id.*, 15.

52. Then-pending claim 17 issued as independent claim 1, from which issued claims 2-15 depend.

VI. PERSON OF ORDINARY SKILL IN THE ART

53. Dr. Tentzeris defines a person of ordinary skill in the art (POSITA) as “someone with at least a Master of Science Degree in an academic area emphasizing electrical engineering, computer engineering, wireless telecommunication systems, or an equivalent field (or a similar technical Master’s Degree, or higher degree)” or someone who “would have had a Bachelor’s Degree (or higher degree) in an academic area emphasizing electrical engineering, computer engineering, wireless telecommunication systems, or an equivalent field with two or more years of work

experience in electrical engineering, computer engineering, wireless telecommunication systems, or an equivalent field” and that “[a]dditional education in a relevant field, or relevant industry experience may compensate for a deficit in one of the other aspects of the requirements stated above.” Ex. 1003, ¶33. Petitioner adopts this definition of a POSITA. Petition, 8-9.

54. I satisfy the requirements of a POSITA under Dr. Tentzeris’s definition of level of skill in the art.

55. I find Dr. Tentzeris’s definition of a POSITA to be too vague. The fields of computer engineering and electrical engineering are too broad to require the specific knowledge to understand and practice the ’669 Patent. The ’669 Patent is classified as H04N 21/2387 “Pictorial Communication (e.g. Television),” G06F 3/14 “Digital output to display device,” H04N 21/231 “Content storage operation, e.g. caching movies for short term storage, replicating data over plural servers, prioritizing data for deletion,” H04N 21/43 “Processing of content or additional data, e.g. demultiplexing additional data from a digital video stream; Elementary client operations, e.g. monitoring of home network or synchronising decoder's clock; Client middleware,” and H04N 21/4402 “Involving reformatting operations of video signals for household redistribution, storage or real-time display.” All of these areas fall into an area of computer science and engineering known as “multimedia systems.” Coursework in multimedia systems is an elective but is not required by any

computer science, computer engineering or electrical engineering degree programs I have encountered. Thus, a degree in electrical engineering or computer engineering would not itself suffice to represent the level of skill necessary to understand the '669 Patent.

56. Given the above discussion, and the following discussion regarding “wireless telecommunications systems,” I would modify Dr. Tentzeris’s opinion of the level of ordinary skill in the art as follows, with added text indicated by bold typeface and eliminated text in strikethrough typeface.

In my opinion, a person of ordinary skill in the art (“POSITA”) relating to, and at the time of, the '669 Patent’s Critical Date would have been someone with **coursework or training in multimedia systems and** at least a Master of Science Degree in an academic area emphasizing electrical engineering, computer engineering, **computer science** ~~wireless telecommunication systems~~, or an equivalent field (or a similar technical Master’s Degree, or higher degree). Alternatively, a POSITA would have had **coursework in multimedia systems and** a Bachelor’s Degree (or higher degree) in an academic area emphasizing electrical engineering, computer engineering, **computer science** ~~wireless telecommunication systems~~, or an equivalent field with two or more years of work experience in **multimedia systems** ~~electrical engineering,~~

~~computer engineering, wireless telecommunication systems, or an~~
~~equivalent field.~~ Additional education in a relevant field, or relevant industry experience may compensate for a deficit in one of the other aspects of the requirements stated above.

57. I satisfy the requirements of a POSITA under my definition of level of skill in the art. My opinions use my definition of a POSITA as a POSITA would need an understanding of multimedia systems to understand the encoding, networked transmission, decoding, storage, and display of digital video as disclosed in the '669 Patent.

58. The level of ordinary skill in the art of the '669 Patent should not include someone who only has experience or training in “wireless telecommunication systems.” Based on my review, the '669 Patent does not address wireless telecommunication systems of any sort. Notably, I did searches for “wireless” and “telecommunication” in the '669 Patent and did not find any instance of those words. While Figure 1 is described as communicating “via a radio signal,” no details for such communication are provided, and the patent also describes wired connections. Ex. 1001, 2:34-38 (describing communication between devices as being realized either through wired connections or radio signals); 5:32-39 (wire-based connections of playback devices and displays).

59. Notably, while Petitioner’s expert, Dr. Tentzeris, may meet his specific definition of a POSITA, I believe that he is not an expert in the relevant subject matter of the ’669 Patent. Dr. Tentzeris has experience with “antennas, fractal RF structures and circuit design...” Ex. 1003, ¶ 2. Based on my review, Dr. Tentzeris does not describe any experience with or expertise in digital video, let alone video synchronization between multiple playback devices. I reviewed Dr. Tentzeris’s CV, as well as the discussion of experience in his deposition, and I found no expertise in any of the ’669 Patent’s subject matter areas of pictorial communication, television, digital display devices, caching movies for short term storage, demultiplexing additional data from a digital video stream, nor reformatting operations of video signals for household redistribution, storage or real-time display. From my review, I believe that Dr. Tentzeris’s experience is instead focused on wireless networking and the design of antennas. Ex. 1003, ¶¶ 2-12.

60. Network communications are often described using a model (called the “OSI” model) comprising various layers. Tannenbaum and Wetherall’s authoritative “Computer Networks” book (a prior edition of which I learned computer networking from in 1987) teaches that networking works in layers of processes, from the software application down to the physical interface to the network medium. Ex. 2001, 41. For example, the Open Systems Interconnection Reference Model (“OSI Model”), which identifies layers from the “physical layer” (lowest) to the

“application layer” (highest). *Id.*, 41-42. At the base is the “physical layer,” which is responsible for the transmission and reception of raw data. That is where Dr. Tentzeris’s expertise is. Above the “physical layer” rest six other layers (i.e., data link, network, transport, session, presentation, and application) that work together to transmit and convert the raw data into user-facing information. The OSI Model is depicted below.

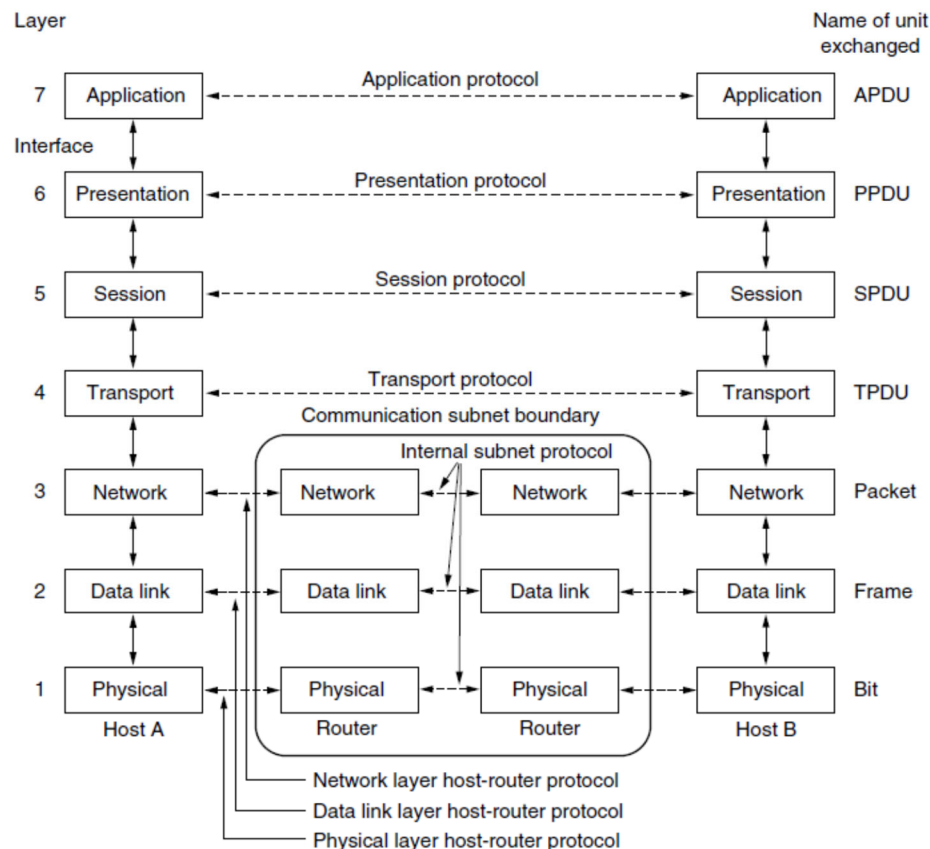


Figure 1-20. The OSI reference model.

Ex. 2001, Fig. 1-20.

61. The subject matter of the '669 patent relates to the layers above the physical layer where Dr. Tentzeris’s expertise lies. In particular, the '669 Patent

concerns the display of video content, which is handled in the application layer, not the physical layer. Ex. 2001, 697-720. The application layer “contains programs that make use of the network.” *Id.*, 49.

62. Dr. Tentzeris’s experience in antenna design works at the physical layer, which “specifies how to transmit bits across different kinds of media as electrical (or other analog) signals.” Ex. 2001, 48. In his deposition, Dr. Tentzeris noted that antenna design is part of the physical layer. Tentzeris Dep., 60:13-17. In my opinion, the subject matter of the ’669 Patent relates to a “higher level” in standard networking models, including mostly the application layer. Dr. Tentzeris conceded that his experience with higher levels of the OSI model—such as the application layer, which is the layer relevant to the ’669 Patent— is exceedingly limited. Tentzeris Dep., 69:6-70:5 (“I am familiar, but not extremely clear.” “So you have different constraints if you have audio then having multimedia transmission. So the meaning whether there’s such a variety of potential applications that I may not be familiar with some of them.”). I have been informed that the Board has found that in such circumstances—when a proffered expert has little relevant expertise—the Board should give limited weight to the expert’s testimony. From my review, Dr. Tentzeris has no experience with or expertise in the layers above the physical layer.

63. Thus, the subject matter of the ’669 Patent relates to the layers above the physical layer where Dr. Tentzeris’s expertise lies. As such, in my opinion, Dr.

Tentzeris’s opinion on issues such as motivation to combine, claim construction, and whether any reference meets any claim limitation should be given little, if any, weight.

VII. CLAIM CONSTRUCTION

64. The Board raised two potential claim construction issues, which I address here.

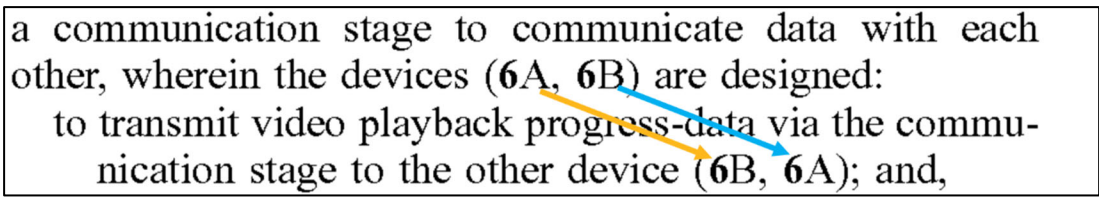
A. “Designed to”

65. The Board suggested that “[t]he parties may wish to address whether the proper scope of [claim 1] does not require either transmission or determination but rather requires that the playback devices be *designed* to transmit and determine.” Paper 11, 13 (emphasis in original). To the extent that the Board is asking whether the playback devices are required to perform a method step of “transmitting” and “determining,” they are not, as the claim is a system claim. In my opinion, “designed to” does require that *each* of the playback devices be expressly configured to transmit and determine during operation of the system, not just that they be merely capable of doing so.

66. While Patent Owner indicated it was unaware of a case in which the Federal Circuit has explicitly construed “designed to,” Patent Owner has informed me that the Federal Circuit has addressed similar terms. In those cases, I understand that that the Federal Circuit has equated “adapted to” with “designed to” and

determined that “adapted to” requires more than mere capability, thus, so too must “designed to.”

67. The claim limitations further require that each device be configured to transmit video playback progress-data to each other, and to determine, based on the received progress data, whether they are in synchronization with the other device, not just the mere capability of doing so. Specifically, limitation [1.3a] requires the playback devices 6A and 6B “communicate data with *each other*,” and limitation [1.3b] recites that each device transmit video playback progress-data ... to the other device (6B, 6A).” By reciting that the same device numbers are each communicating with each other (“devices (6A, 6B) ... transmit ... to the other device (6B, 6A)”), limitation [1.3b] requires reciprocal communication—that device 6A transmits to 6B *and* 6B transmits to 6A. In my opinion, this mutual exchange of playback progress data comes from the claim itself, as shown below in the claim language that I have annotated.



a communication stage to communicate data with each other, wherein the devices (6A, 6B) are designed: to transmit video playback progress-data via the communication stage to the other device (6B, 6A); and,

The image shows a rectangular box containing text. Two arrows originate from the text: a blue arrow points from '(6A, 6B)' to '(6B, 6A)', and an orange arrow points from '(6B, 6A)' to '(6A, 6B)', illustrating reciprocal communication.

Ex. 1001, Claim 1 (annotated).

68. As described in the specification of the ’669 Patent, each playback device 6A and 6B is designed to transmit its own playback progress data after a tracked

lapse of its own clock. Ex. 1001, 5:49-53. “After one second has lapsed, the respective device 6A, 6B transmits the playback progress-data, which represent the frame number of the correctly used frame in the respective device 6A, 6B.” *Id.* This is a reciprocal exchange of playback progress data because the “transmission of the playback progress-data of the device 6A is received at the device 6B and *vice versa*.” *Id.*, 5:53-55 (emphasis in original). Further, the ’669 Patent’s playback devices are designed to “independently” determine “that they are in a synchronous or asynchronous playback progress” with other playback devices. *Id.*, 2:29-33. Specifically, each playback device is “designed to compare a frame number received” from another device “with a frame number of the frame currently played back at the device and to determine an asynchronous playback progress if the difference in the frame numbers compared with each other exceeds a pre-determined threshold value.” *Id.*, 2:54-59.

69. Based on my review of the prosecution history, Applicant’s arguments underscored the required reciprocal nature of the communication between playback devices so that each device can independently make a synchronicity determination. *See* § V.C. Again, the Applicant was not merely suggesting that the devices could have the mere capability of communicating and determining, but that they were expressly configured to do so. The Applicant explained that playback devices communicating “with each other” involved reciprocal communication of playback

progress data ([1.3b]) and the devices subsequently compared their own playback progress to the playback progress of another device ([1.3c]). Ex. 1002, 140-41 (arguing that “[e]ach playback device ... comprises a communication stage *to communicate data with each other*, wherein the devices are designed to transmit video playback progress data *via the communication stage to the other device* and to determine, based on the received progress data, whether it is in a synchronous or asynchronous playback progress with the other devices”) (emphasis in original); *id.*, 141 (arguing that in then-pending claim 1 “each individual playback device can independently detect an asynchronous playback progress within the group of playback devices,” which the individual playback devices achieve “by a simple and fast comparison of the playback progress of another device or of other devices with its own playback progress”).

70. Indeed, the Applicant expressly argued that “each other” described a bidirectional and reciprocal exchange. *Id.* (arguing that “[w]ith each other’ particularly describes a **bidirectional** relationship (*cf.* Merriam-Webster dictionary, definition for ‘*Each other*’: ‘*each of two or more in **reciprocal** action or relation*’)”) (emphasis in original); *id.* (arguing that unlike the asserted prior art, then-pending claim 1 required the “playback devices [to] communicate ***with each other bidirectionally***, thereby enabling ***independent*** detection of an asynchronous playback progress within the group of playback devices ...”) (emphasis in original). As noted by the

Applicant, the requirement of devices communicating “with each other” was to allow each device to make a “comparison of the playback progress of another device or other devices with its own playback progress.” *Id.*

71. The applicant explicitly distinguished systems where there is a “master” device that transmits synchronization information to a set of non-master devices. *Id.* Applicant identified such systems as “unidirectional” communication, and expressly distinguished such systems from the bidirectional communications of the invention. Applicant pointed out that in master-type systems, all progress is in relation to the master device, *id.*, and unlike the claimed system, that type did not allow each device to compare playback progress with each other device. *Id.*, 141-42.

72. Claim element 1.3 requires:

a playback device (6A) designed: transmit video playback progress-data via the communication stage to the other device (6B, 6A), and to determine based on the received progress data whether it is in a synchronous or asynchronous playback progress with the other device 6B,

AND

a playback device (6B) designed: transmit video playback progress-data via the communication stage to the other device (6B, 6A), and to determine based on the received progress data whether it is in a synchronous or asynchronous playback progress with the other device 6A.

73. Thus, the claim element 1.3 requires playback devices that are configured to, during operation of the claimed system, “transmit video playback progress-data” to each other (i.e., reciprocally) and “determine based on the received progress data” (i.e., the data previously transmitted from the other devices in the reciprocal exchange) “whether it is in synchronous or asynchronous playback progress with the other devices.” Ex. 1001, Claim 1.

B. “Communication Stage to Communicate Data With Each Other”

74. The Board also identified as a potential claim-construction issue “whether ‘communication stage to communicate data with each other’ as recited in claim 1 is a means-plus-function limitation that invokes 35 U.S.C. §112 (f).” Paper 11, 11.

75. Based on my review, neither party proposed that this is a means-plus-function limitation. Patent Owner contends that construction of this term, including whether or not 35 U.S.C. §112(f) applies is unnecessary for the resolution of this matter. I understand that no construction is necessary because regardless of whether “communication stage” is itself a structural term or invokes structure from the specification, for the reasons discussed in further detail below, it is my opinion that Petitioner fails to identify any prior art that is designed to operate as claimed. In particular, I find that Petitioner fails to identify any reference where each playback device is designed to *both* transmit video playback progress-data through the

communication stage *and* determine, based on progress data received through the communication stage, whether it is in synchronous or asynchronous playback progress with the transmitting device.

VIII. LEGAL STANDARDS

76. I am not an attorney and thus do not provide any legal opinions. Counsel has notified me of the legal principles that apply in assessing whether patent claims are obvious and unpatentable. Throughout my work, I have studied and analyzed patents and patent claims from the perspective of a person skilled in the art. My understanding of the law is as follows:

77. I have been informed that in *inter partes* review proceedings, the Petitioner bears the burden of proof to prove that the claims that were challenged in the Petition and for which the Board instituted review are unpatentable. It is my understanding that the Petitioner also bears the burden of proving a proposition of unpatentability by a preponderance of the evidence.

78. It is my understanding that based on its filing date, the America Invents Act (“AIA”) applies to determination of invalidity of the ’669 Patent.

79. Patent Owner’s counsel has informed me that a claim may be unpatentable as obvious under § 103 if the subject matter described in the claim as a whole would have been obvious before the effective filing date of the claimed invention to a person having ordinary skill in the art to which the claimed invention pertains.

80. I have been informed that, prior to considering the prior art, the claims are first analyzed to determine what subject matter the claims cover. I understand that the claims are read from a POSITA's perspective at the time of the alleged invention. I understand that the words of a claim are generally given their ordinary and customary meaning as understood by a POSITA in view of the entire patent specification in which they are present and the prosecution history of the patent.

81. I understand, nevertheless, that a claim's words may be given a meaning different than their plain and ordinary meaning if: (1) a patentee explicitly and unambiguously defined a term in a different manner as compared to its plain meaning; or (2) a patentee "disclaims" the full scope of a claim term's plain meaning, such as, by clearly and unambiguously stating during prosecution that a claim term does or does not encompass certain subject matter that may otherwise be encompassed by the plain words of the claim.

82. I have been informed that, after construing the claims, the teachings of the prior art are evaluated. I understand that the information that is used to evaluate whether an invention is new and not obvious is generally referred to as "prior art" and generally includes patents and printed publications (e.g., books, journal publications, articles on websites, product manuals, etc.).

83. I understand that although the ultimate question of the obviousness analysis is a legal determination, obviousness is based on many factual inquiries,

including: the prior art's scope and content, the distinctions between the claimed subject matter and the prior art, the level of ordinary skill in the art at the time of the invention, and any "objective indicia" or "secondary considerations" of non-obviousness, which must all be considered.

84. I have been informed that, in ascertaining the scope and content of the prior art, a prior-art reference is deemed relevant if it falls within the field of the inventor's endeavor, or if it is reasonably pertinent to the particular problem that the inventor was attempting to solve. I understand that a reference is reasonably pertinent if it logically caught an inventor's attention in considering the problem sought to be solved.

85. I have been informed that, to evaluate the differences between the prior-art references and the claimed subject matter, the claimed invention must be considered as a whole. I understand that this involves demonstrating that a POSITA, facing the same problems as the inventor and without knowledge of the claimed invention, would have recognized the elements in the prior art and combined them in the claimed manner.

86. I understand that there are many rationales for combining prior-art references. For example, I have been informed that it is considered obvious to:

- combine prior-art elements according to known methods to yield predictable results;

- substitute one known element for another to obtain predictable results;
- use the prior-art elements in a predictable way according to their established functions;
- apply a known technique to a known device (method or product) ready for improvement to yield predictable results;
- choose from a finite number of identified, predictable solutions, with a reasonable expectation of success;
- or if there is some teaching, suggestion, or motivation in the prior art that would have led a POSITA to modify a prior-art reference or combine prior-art teachings to arrive at the claimed invention.

87. I understand, however, that a POSITA can come to the claimed invention for completely different reasons than the inventors and therefore does not need to have the same motivations or reasons to combine the prior art as the inventors.

88. I understand that when reviewing the prior art, the prior art cannot be combined or modified with “hindsight.” I have been informed that hindsight designates scenarios when the asserted patent is employed as a framework to pick and choose aspects from the prior art to arrive at the claims. I understand that hindsight also occurs when rationales are adopted that are identified by the patent-at-issue, but

would not have been recognized by those in the art. Alternatively, I have been informed that the obviousness analysis is evaluated from the perspective of a POSITA, as of the critical date of the patent-at-issue and with all the prior art before them. I also understand that with this in mind, the analysis includes determining whether the POSITA would have independently arrived at the claimed invention without the help of the patent-at-issue for guidance.

89. I understand that to evaluate obviousness, “objective indicia” or “secondary considerations” of non-obviousness must also be considered, and include, among a few others, whether: (1) there was a long-felt need for the claimed invention; (2) the claimed invention has attained commercial success; (3) others have copied the claimed invention; (4) others have attempted but failed to create the alleged invention; (5) there was praise of the invention in the field; and (6) there was skepticism that the claimed invention could be achieved.

90. Additionally, I have been informed that a petition must identify, for any terms with means-plus-function limitations, the particular portions of the specification that describe the structure, material, or acts corresponding to each claimed function. I also understand that a rebuttable presumption exists that without use of the term, “means,” a claim term is not interpreted as means-plus-function. However, I have been informed that other nonce words like “component” have been found to

satisfy the rebuttable presumption and invoke a means-plus-function claim construction of such a claim term.

91. I have been informed that a petitioner seeking to demonstrate that the prior art discloses a means-plus-function limitation must prove that the corresponding structure—or an equivalent—was present in the prior art and performing the same claimed function.

92. I understand that proving structural equivalence does not require a component-by-component analysis. I have been informed that it is sufficient to show structure, materials, or acts that perform the claimed function in substantially the same way to achieve substantially the same result because the claim limitation is the overall structure corresponding to the claimed function and not individual components.

93. I have been informed that the standard for determining whether the prior art discloses the corresponding structure or an equivalent is whether there are insubstantial differences, which means that if the assertedly equivalent structure performs the claimed function in substantially the same way to achieve substantially the same result as the corresponding structure described in the specification, it is equivalent.

94. Lastly, I understand that in *inter partes* review proceedings, the Petitioner must demonstrate the obviousness of a claim by “a preponderance of the

evidence.” I have been informed that the preponderance of the evidence standard requires that a reasonable factfinder would find a material fact more probable than the nonexistence of that fact. I understand that this standard does not permit speculation concerning particular facts and is rather focused on whether the evidence more likely than not demonstrates the existence or non-existence of particular material facts. I have been informed that “preponderance of the evidence” is a lower standard than “clear and convincing evidence” (which requires a fact to be substantially more likely to be true than untrue), or “beyond a reasonable doubt” (which is an exceedingly high standard that I understand is usually used in criminal matters).

95. Throughout my Declaration, I have applied the “preponderance of the evidence” standard.

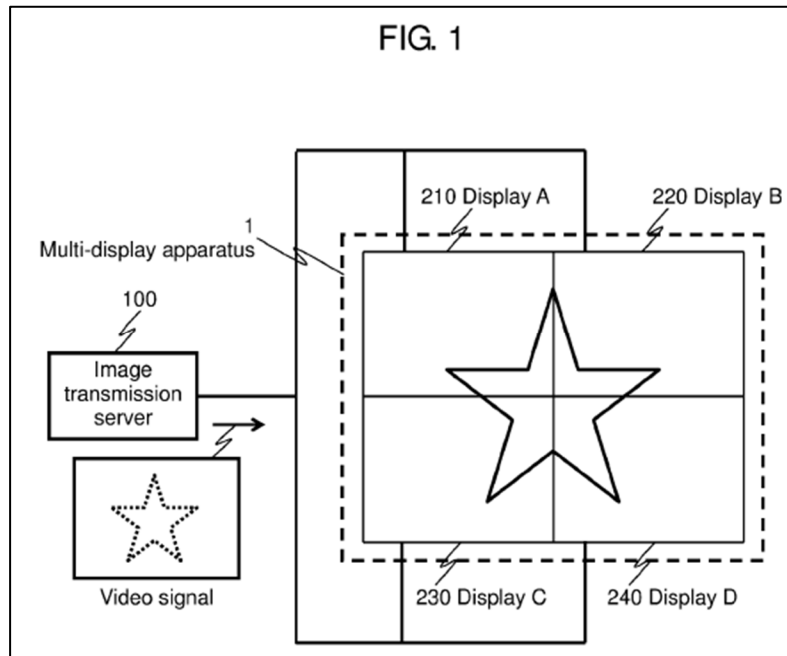
IX. GROUND 1: Swafford/Masumoto

A. Summary

1. Masumoto (Ex. 1005)

96. Masumoto comes from a very different field than Swafford. Whereas Swafford was concerned with various small-sized displays for shelf and product labels, Masumoto concerns synchronization of large displays—“multi-display apparatus for displaying a single image.” Ex. 1005, Abstract. Masumoto’s large display apparatus 1 uses an image transmission server 100 to transmit a video signal to

component displays 210-240. Each display “cuts out and displays a portion...from the received image” sent to all four displays.⁴ Ex. 1005, Fig. 1 (below), [0039].



Ex. 1005, Figure 1.

97. Because Masumoto’s apparatus displays one image using multiple displays, it must “match ... image display timings and image display positions of the entire image by connecting an image transmission server and multiple displays to a network.” *Id.*, [0015]. Coordinating the timing requires the displays to communicate “specific information” including “frame number or time stamp” at that time to a

⁴ Note that Masumoto refers to a display displaying a “portion in charge.” A POSITA would understand this to mean that each display is displaying the portion that such display is in charge of displaying.

“controller” 214 of a separate display. *Id.*, [0017], [0107]-[0108]. “The controller sends a request signal requesting other display to transmit specific information of a video signal displayed on the other display, and receives the specific information from the other display.” *Id.*, [0017].

98. Unlike the ’669 Patent, Masumoto’s displays do not exchange playback progress-data *with each other*. Instead, a single “master display” requests timing information from all other displays, and the other displays send their timing information only to the master—not the other non-master displays as in the ’669 Patent. Ex. 1005, [0108]. Masumoto’s displays receive frame numbers or time stamps from either the “image transmission server” or a single “master display” determined at the start of operation.

99. Masumoto discloses a total of six embodiments. The first, second, third, and fourth embodiments describe a multi-display system where each display can determine its own frame rate, but each display does not determine if it is in a synchronous or asynchronous playback progress from any playback progress data received from another display. The fifth embodiment relies on a master display described further below. The sixth embodiment describes only the assignment of IP addresses to displays and does not disclose any details relevant to the ’669 Patent.

100. The First Exemplary Embodiment of Masumoto (Ex. 1005, [0036]-[0061]) discloses a system where each display determines if it can display the

received video at the expected frame rate. A display that determines it cannot display at the expected frame rate determines a reduced frame rate at which it can display (Step S2 of Fig. 3, reproduced below). Then the display notifies the other displays of this reduced frame rate, without sending a frame number (Step S3 of Fig. 3). Then a new frame number is sent **from image transmission server 100** (not from another display) to all of the displays (Step S4). A Modified Example of the First Exemplary Embodiment (Ex. 1005, [0062]-[0069]) iterates Step S2 in Fig. 4 (also reproduced below), but does not change the fact that Step S3 does not send a frame number from one display to another, nor does it change the fact that Step S4 represents a new frame number is sent only from the image transmission server 100 to all of the displays. None of these displays in the First Exemplary Embodiment, nor in the Modified Example, makes its own determination of synchronous or asynchronous playback progress based on playback progress data received from other playback devices.

101. The Second Exemplary Embodiment (Ex. 1005, [0070]-[0081]) initially selects a master display, then uses the master display to inform the other displays of the updates to frame rate that the first embodiment communicated directly to other displays.

102. The Third Exemplary Embodiment (Ex. 1005, [0082]-[0088]) places a limit on the number of times a display can notify the master display of an updated frame rate.

103. The Fourth Exemplary Embodiment (Ex. 1005, [0089]-[0101]) discloses a system where a video signal is displayed only on a subset of the displays. If one of these displays in the subset cannot display said video at the desired frame rate, then it notifies only the other displays in the subset of the new frame rate (instead of all of the other displays as in the first embodiment).

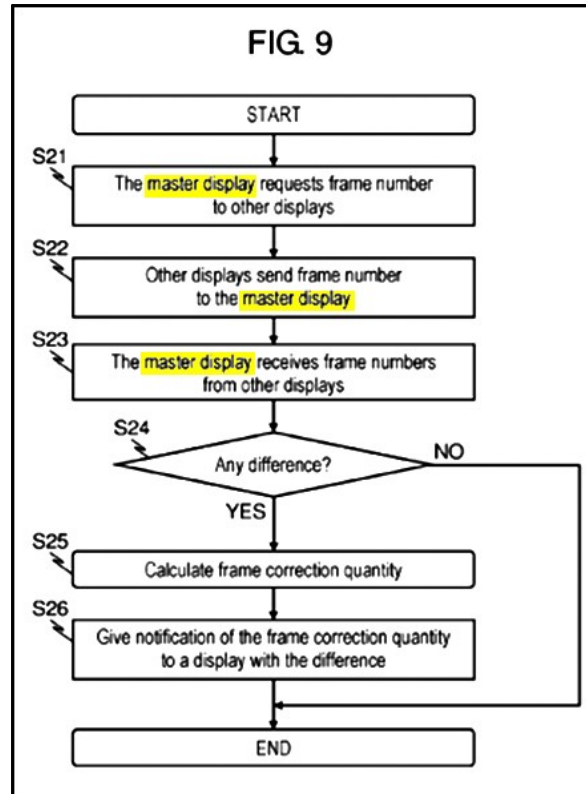
104. The Fifth Exemplary Embodiment (Ex. 1005, [0102]-[0126]), on which the Petition relies, uses on a single “master display” that requests timing information from the other displays, and the displays send that timing information only to it. Ex. 1005, [0108]. “[O]ne display requests other displays to notify the frame number or time stamp of the video signal displayed on each of other displays[,] . . . [noting that] a display requesting this notice is called a master display.” *Id.* Masumoto’s multi-display system determines, either at installation or when the system is powered on, which display should be the master display by measuring which display has the “highest processing capability” (e.g., CPU load rate). Ex. 1005, [0120]-[0121], [0124]. Masumoto’s system allows only one master display at a time—“only one master display can be set in multi-display apparatus 1.” *Id.*, [0124]. Therefore, if there is a tie (i.e., more than one display has the same highest processing capability),

that a tie is broken using a predetermined rule, also referred to a “rule in advance.”

Under the “rule in advance” system, the master display is designated based on, for example, designating the display that notified of its processing capacity first as the master display. Ex. 1005, [0124]. “Based on a result of comparison, each of display A210 to display D240 determines itself to be a maser display if the measurement result of its own processing capacity is the highest, and not a master display if not the highest.” *Id.*, [0124]. Masumoto discloses that “only one master display can be set in multi-display apparatus 1.” *Id.*, [0124] (“[b]y providing this kind of rule in advance, only one master display can be set in multi-display apparatus 1.”). *Id.* While Masumoto discloses that any display can act as the master display, that determination is made during installation of the system, or when the system is powered up. *Id.*, [0121], [0076]. It does not change on the fly for example. The master display system “match[es] display timings of all [non-master] displays at a desired original timing of the video signal [from the master display], without adjusting the displays to a display with the slowest display timing.” *Id.*, [0126].

105. Put differently, because the master display controls the timing of the other displays, frame information (the purported playback progress data) flows in a single direction—to the master display. The master display never sends its frame information (or anything else that could be considered playback progress data) to any other display. Nor do the other non-master displays send such data to each other,

as in a peer-to-peer system. Thus, for instance, in a system consisting of four displays, three devices (the three non-master devices) send frame information to the master device and not to the other three devices. As depicted in Fig. 9 (below), the designated master display makes a request for frame numbers from other displays (step S21), each of which sends that information to the master display (step S22). The master display uses the frame information received from the other displays to calculate whether to send a correction to the sending display (step S24-S26). Ex. 1005, Fig. 9 (below), [0108]-[0119]. Further, “[s]ince the video signal also has information on the number of frames displayed per second (display frame rate) as another added information, the frame number of the frame to which the time stamp is added can be calculated based on the time stamp and display frame rate.” *Id.*, [0109]. Again, unlike the ’669 Patent, where each playback device makes its own determination of synchronous or asynchronous playback progress based on frame information (i.e., playback progress data) from the other playback devices, Masumoto’s non-master displays only do what they are told by the master display. Once a master display is designated, it is the only display that makes a synchronization determination. Unlike in the peer-to-peer system of the ’669 Patent where each display can make its own synchronization determination, in Masumoto’s system only the master display makes that determination. This is shown in Fig. 9.



Ex. 1005, Figure 9 (annotated)

2. Swafford (Ex. 1004)

106. Swafford discloses a system with a “streaming video ... apportioned among displays on electronic label devices and the packages,” which “simultaneously output a different portion of the streaming video.” Ex. 1004, Abstract. I understand that Swafford’s system of “communicating and distributing content” is shown in Fig. 42, which I have annotated below.

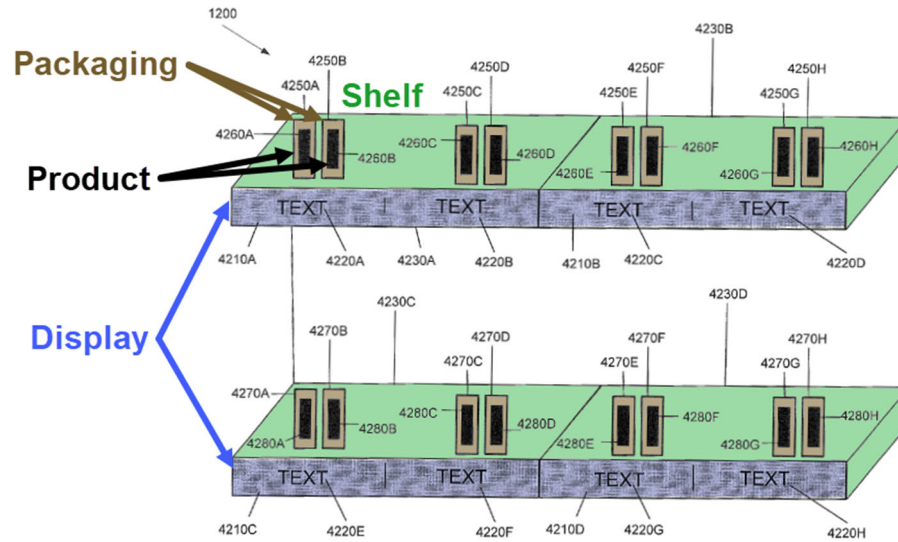


FIG. 42

Ex. 1004, Figure 42 (annotated).

107. As shown, displays (4210A-H) are affixed to shelves for packaged products (4260A-H, 4280A-H, 4250A-H, 4270A-H) to show product information (text 4220A-D).

108. Information is communicated to displays (4210A-H) using the “network and hub” architecture of Fig. 39 (reproduced below) (*id.*, Fig. 39, [0382]). As shown in my annotated version of Fig. 39 (below), the hub communicates data to the end-point devices. *Id.*, [0350]. It is my opinion, after reviewing Swafford, that it does not disclose *any* communication—let alone bidirectional/reciprocal communication—of playback progress data between the end-point devices. Further, it is my opinion, based on my review of Swafford, that it does not disclose any particular synchronization system, and does not disclose that each display manages its own synchronization with other displays.

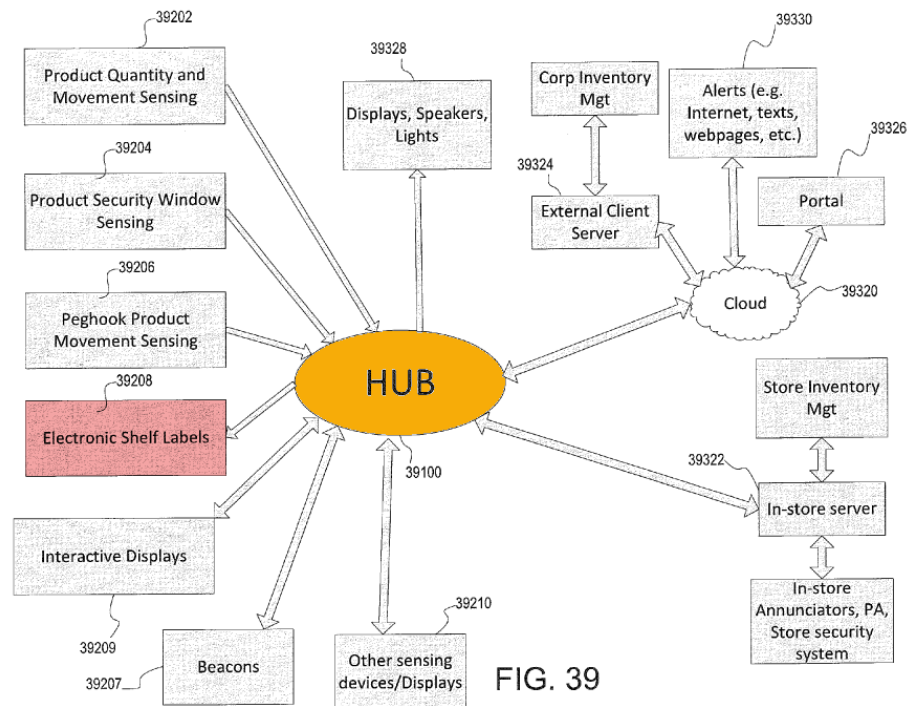


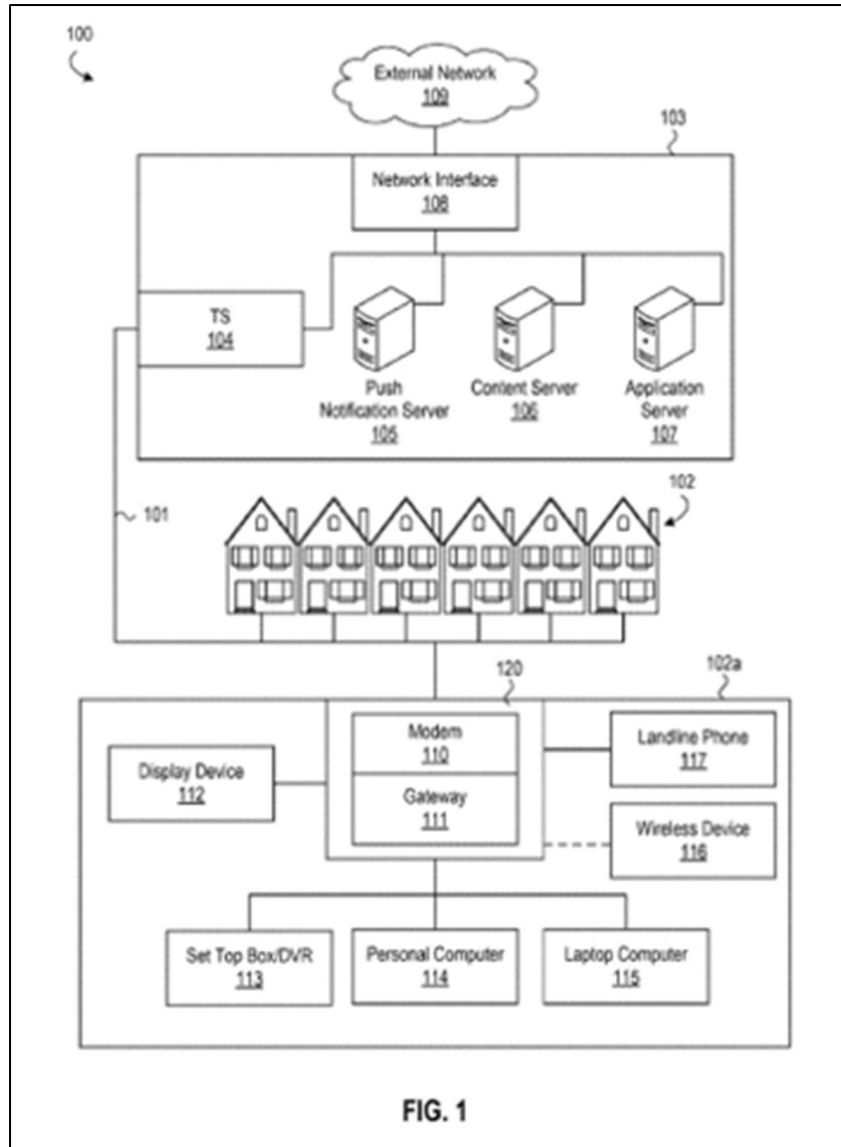
FIG. 39

Ex. 1004, Figure 39 (annotated).

3. Kipp (Ex. 1006)

109. Kipp discloses a system for synchronizing playback of “segmented video content across multiple video playback devices.” Ex. 1006, Abstract. Kipp describes a problem that “[p]layback devices may connect to an IP video server at slightly different times and thus receive the portions of video content at different times,” resulting in playback that is “out of sync” when that video content is intended to be played back “in real time” from a “stream.” *Id.*, [0002]. As depicted in Fig. 1 (below), Kipp is concerned with ensuring that the same program will be heard at the same time over a phone call connecting two different locations—such as “sports bars, classrooms, meeting rooms ... hotels, apartment buildings, [and] residences.”

Id., [0036]. Notably, Kipp’s “segmented” video does not refer to different portions of an image, being displayed on different displays. Rather, when Kipp describes “segmented” video, it is referring to different time segments of the full video. Ex. 1006, [0024] (segmented video listed on a play list). Put differently, Kipp’s video segments are full pieces of video, that are mirrored over multiple displays, and it is undisputed that Kipp does not disclose extending video across multiple displays where each display shows only a portion of the video as in the ’669 patent.



Ex. 1006, Figure 1.

B. The Swafford/Masumoto Combination Does Not Disclose Several Limitations of the Challenged Claims

1. Claim 1 (and therefore all challenged claims)

110. Claim 1 is the only independent claim in the '669 patent. Petitioner applies a mix-and-match type analysis for the claim. So, Petitioner relies on Masumoto

to teach limitations [1.3b] and [1.3c]. But because Masumoto is fundamentally a different type of system (master/slave) than the claimed system (peer-to-peer), Masumoto does not teach these limitations. Petitioner relies on Swafford to teach limitation 1.4, which requires that the display devices display “product information or product price related information” “overlapping with a video content or substituting a video content.” Yet, Petitioner concedes that Swafford does not expressly teach this limitation, and instead relies on inherency to teach it. This argument fails for the simple reason that Petitioner concedes that, at best, Swafford discloses that video *might* overlap—the antithesis of inherency. Inherency requires that the video *necessarily* overlaps (or is substituted), and the Petition offers no evidence that this is true. Nor does the Petition articulate a rational basis on which a POSITA would be motivated to combine Masumoto with Swafford. The two systems are directed to completely different applications—Masumoto is directed to large displays that one might see at a trade show, whereas Swafford is directed to electronic store labels. The Petition does not explain why a skilled artisan would be motivated to combine such disparate art.

- a. **Claim element [1.3] “and a communication stage to communicate data with each other, wherein the devices (6A , 6B) are designed: to transmit video playback progress-data via the communication stage to the other device (6B , 6A); and, to determine based on the received progress data whether, it is in a synchronous or asynchronous playback progress with the other devices (6B , 6A)”**

- i. **Swafford does not disclose claim element [1.3]**

111. Petitioner concedes that Swafford does not disclose transmitting playback progress-data between playback devices so that each may make a synchronicity determination. Paper 2 (“Petition”), 25. Petitioner relies exclusively on Matsumoto to teach these limitations. Petition, 25-27; Ex. 1003 ¶¶74-85. Dr. Tentzeris admits that Swafford does not disclose claim element [1.3]. “Swafford does not explicitly describe that the video playback progress-data is transmitted from one continuous display shelf edge label device to another continuous display shelf edge label device.” Ex. 1003, ¶ 74. I agree that Swafford does not disclose claim element [1.3].

- ii. **Masumoto’s summary does not disclose claim element [1.3]**

112. Masumoto provides no such teachings. Other than Masumoto’s Fifth Exemplary Embodiment, discussed in detail below, Dr. Tentzeris cites only a single paragraph [0017] of Masumoto as disclosing this limitation. Ex. 1003, ¶¶ 75-76. Dr. Tentzeris quotes extensively from this single paragraph: “[t]he multi-display apparatus includes the plurality of displays connected to a network. Each of the plurality

of displays includes a communication unit that communicates via the network and a controller. The controller [in one display] sends a request signal requesting other display to transmit specific information of a video signal displayed on the other display and receives the specific information from the other display. The controller gives notification of correction to the other display sending the specific information with a difference when the specific information received differs from specific information of a video signal that is supposed to be displayed.” Ex. 1003, ¶ 75 (quoting Ex. 1005, [0017]) (alterations by Tentzeris).

113. Dr. Tentzeris inserts the phrase “[in one display]” to the Masumoto sentence “[t]he controller sends a request signal requesting other display to transmit specific information of a video signal displayed on the other display, and receives the specific information from the other display.” In doing so, Dr. Tentzeris mischaracterizes this “one display” as being any display and that this “one display” could be the other display at a later step, which is not the case.

114. Beyond this one paragraph [0017] of Masumoto’s Summary, Dr. Tentzeris’s remaining opinions on Claim element [1.3] only refer to the Masumoto’s “Fifth Exemplary Embodiment” ([Ex. 1005, [0102]-[0126]]). This fifth embodiment requires the determination of a single “master” display throughout its operation, and this one “master” display is the only display that sends a request signal to the other displays. “First, one display requests other displays to notify the frame number or

time stamp of the video signal displayed on each of the other displays (Step S1). ...

[A] display requesting this notice is called a master display, ... A method of determining the master display is described later.” Ex. 1005, [0108]. “Accordingly, a display with the highest processing capability in multi-display apparatus 1 is set as the master display to facilitate retention of performance of the entire device.” *Id.*, [0120].

115. In reviewing the transcript of the Tentzeris deposition, Dr. Tentzeris appears to believe that the Fifth Exemplary Embodiment does not require one, and only one, master display. Tentzeris Dep., 130:15-22, 132:14-24, 133:14-15. Particularly, Petitioner’s expert asserted that “easily, [there could be] different master displays” because according to Dr. Tentzeris, “[t]here’s nothing saying in [Masumoto] **one** master display.” *Id.*, 132:14-16 (emphasis added). He further expounded in his deposition that “[t]here’s nothing in [Masumoto] denoting a number of master displays,” let alone a requirement of “the only or the exclusive master display.” *Id.*, 132:19-24. Dr. Tentzeris is wrong on this point.

116. First, the Fifth Exemplary Embodiment specifically uses a “rule in advance” to break a tie (if for example, two or more devices have the same processing capacity) to ensure “only one master display can be set in multi-display apparatus 1.” Ex. 1005, [0124]. Further, Dr. Tentzeris declared that the display is called the master display “for convenience.” Tentzeris Dep., 122:17-21. Dr. Tentzeris

explained that “the different displays . . . may be the master display . . . for convenience.” *Id.*, 130:8-9.

117. Second, the Fifth Exemplary Embodiment considers it an error condition if more than one device is accidentally set to be the master display. In particular, in such a case, the determination of master display is reset. Ex. 1005., [0125]. Dr. Tentzeris testified that the language: “A rule should be further provided to reset *a* master display” supported his view that there can be multiple master displays. *Id.* (emphasis added); Tentzeris Dep., 133:12-24 (emphasizing this language). In his deposition, Dr. Tentzeris explained that this language “does not disclose a specific number” of master displays. *Id.* Thus, Dr. Tentzeris asserted that “[t]his is a generic statement saying that possibly one out of many master displays could be reset.” *Id.* But Dr. Tentzeris ignores the entire purpose of resetting the master display. The resetting occurs if none or more than one device is designated the master display. Ex. 1005, [0125]. A POSITA would understand that the resetting is necessary because the Fifth Exemplary Embodiment requires one and only one master display. And if that requirement is not met, the system will not work, and the master display must be redetermined.

118. Third, the Fifth Exemplary Embodiment would not work if there were more than one master display. Having multiple master displays would result in multiple and potentially different “frame correction quantit[ies]” being sent to each non-

master display. This could result in displays being out of synchronization, which is entirely contrary to the purpose of Masumoto.

119. Fourth, the Fifth Exemplary Embodiment does not describe any master display receiving or processing a “frame correction quantity.” Therefore, if multiple devices were considered master displays, it would be likely that those displays would get out of synchronization with each other. In the extreme case, there is the potential that all displays could be identified as master displays, which might result in no “frame correction quantity” messages being sent, and no attempts at synchronization occurring.

120. Dr. Tentzeris also testified that he believed the master display could change during operation of the Fifth Exemplary Embodiment. Tentzeris Dep., 132:2-5 (explaining that “any one of these displays could be a master display at any given moment based on a variety of criteria”). Again, Dr. Tentzeris is wrong on this point. Masumoto discloses in detail the process of selecting a master display. *See* Ex. 1005, [0120]-[0126], Fig. 10. The Fifth Exemplary Embodiment chooses a master display by selecting the display with the highest processing capacity. *Id.*, [0120]. This process is linear (no iteration) and begins with the step to “[m]easure processing capacity at each display” which occurs “when multi-display apparatus 1 is installed, or when the power of the entire device is turned on.” *Id.*, [0121]. A POSITA would have understood Masumoto’s process of determining the master display to be an

initialization process and would not be repeated during the remaining operation of Masumoto's system. Further, as described above, if more than one device is tied for having the highest processing capacity, a determination is made based on another, predetermined factor, such as selecting the device that notified of its processing capacity first. *Id.*, [0124]. Masumoto describes this determination occurring on installation or power on. *Id.*, [0121]; *see also id.*, [0076]. Other than the error condition, where zero or more than one master display is determined, nowhere does Masumoto disclose changing the master display during operation.

121. Additionally, in his deposition, Dr. Tentzeris asserted that each device in the Fifth Exemplary Embodiment makes its own determination about progress. Tentzeris Dep., 139:4-141:11. He further explained that "A210 determines, by itself, whether it's synchronized or not synchronized and readjust the video playback performance." *Id.*, 139:4-6. According to Dr. Tentzeris, the frame correction quantity is "just a number," and the controller in the receiving device uses that number to determine whether the device is asynchronous or not. *Id.*, 140:5-11. Dr. Tentzeris concluded that "based on the whole package or the whole information accompanied in this frame correction quantity and its processing by the controller or the microprocessor of A210, the determination of synchronization or a synchronization is taking place." *Id.*, 140:5-10. However, I find that this ignores that the frame correction quantity is only sent if the frame correction quantity would not be zero. In

other words, in my opinion, any reception of frame correction quantity means the device is necessarily asynchronous. In addition, Dr. Tentzeris's view ignores that the determination must be made from received progress data, which the frame correction quantity is not.

iii. Masumoto's first, second, third, fourth and sixth embodiments do not disclose claim element [1.3]

122. Dr. Tentzeris concludes, relying solely on paragraph [0017] in Masumoto's Summary section, that "Masumoto teaches that the displays can communicate data with each other and the displays are designed to transmit **specific information** of a video signal displayed on one display to the other display and to determine synchronization or asynchronization based on the **specific information**. Masumoto teaches the **specific information** of a video signal displayed on one display as the video playback progress-data in [1.3]." Ex. 1003, ¶ 76. I disagree.

123. Claim element 1.3 requires each device to transmit video playback progress-data such that another device can determine whether it is in a synchronous or asynchronous playback progress. The '669 Patent defines "asynchronous playback progress" as a condition where "the difference in the frame numbers compared with each other exceeds a predetermined threshold value." Ex. 1001, 2:54-64. Dr. Tentzeris recognizes this reliance in his declaration. "Furthermore, Masumoto teaches that the specific information can be frame number, like the '669 Patent, or

time stamp. “[T]he frame number is an example of specific information of the video signal, and the time [stamp] is also another example of the specific information of the video signal.” Ex.1005 (Masumoto), [0107].” Ex. 1003, ¶ 77.

124. Masumoto discloses in the first embodiment (and the second, third and fourth embodiments that are based on it) that the displays only receive any frame number or time stamp from the image transmission server. Ex. 1005, [0061].

125. Masumoto’s sixth embodiment describes only the assignment of IP addresses to displays and does not disclose any details relevant to claim element [1.3].

iv. Masumoto’s fifth embodiment does not disclose claim element [1.3]

126. A POSITA would have understood the ’669 Patent’s playback devices, as described in the specification and recited in claim 1, are designed to operate differently from those in Masumoto’s Fifth Exemplary Embodiment.

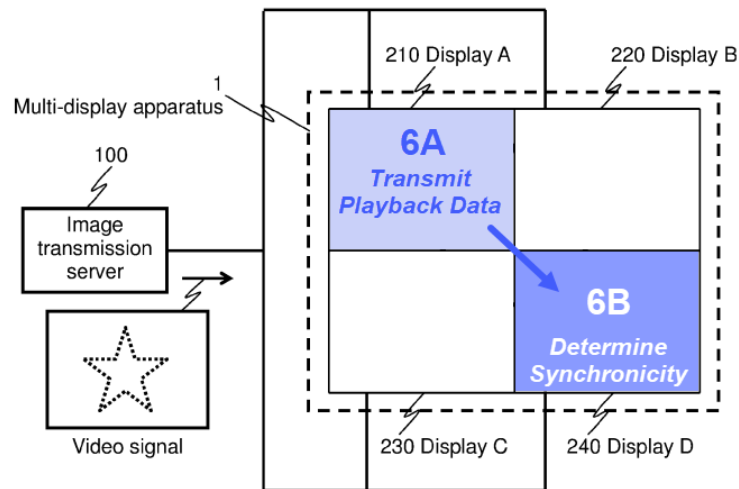
127. Masumoto, in contrast, discloses a master/non-master architecture where no single device—let alone devices—is designed to *both* “transmit video playback progress-data” *and* “determine based on the received progress data whether it is in a synchronous or asynchronous playback progress with the other devices.” Ex. 1001, Claim 1. Masumoto teaches a hub-and-spoke transmission/determination configuration that the ’669 patent expressly distinguishes from the claimed invention. Specifically, Masumoto discloses a playback synchronization system where a

“master display⁵” “calculates a desired frame number” and notifies other non-master display devices to correct their own frame number based on the calculation. Ex. 1005, [0110], [0113] (the display “compares its calculation result with the frame number received . . . for each display to determine any difference.”). Masumoto’s system is designed such that the master display *receives* “specific information” from the non-master devices (the alleged playback-progress data, *see* Petition, 25-27, 65-66), but it does not *transmit* to the other displays its own video playback progress data. Ex. 1005, [0108] (“**one** display requests other displays to notify the frame number or time stamp of the video signal displayed on each of other displays”) (emphasis added), [0110] (“time that this frame number is displayed may be sent to display D240 together with the frame number”), [0120], FIG. 9. While the non-master displays are designed to transmit their playback progress-data to the master display, they are not designed to determine whether they are synchronized with the other displays using playback progress data received from another device. Ex. 1005, [0113]-[0118], FIG. 9. Only the master display makes a synchronization determination, which it bases on information received from the non-master devices. *Id.*, [0113]-[0118], FIG. 9. As shown in annotated Figure 1 below, Masumoto discloses

⁵ The Petition also refers to the master display by the “controller” of the master display. Petition, 25-26, 34.

a unidirectional transmission of playback progress-data to a master display, and a unitary determination by the non-transmitting master display of synchronicity.

FIG. 1



Ex. 1005, Fig. 1 (annotated).

128. Petitioner seems to recognize this problem because it proposes that Masumoto teaches that each playback device has the ability to serve as a master or non-master, and so, when one device is the master it can determine, and then later if it is designated a non-master, it can transmit. Petition, 15 (citing Masumoto’s disclosure that “All displays have the same structure”); Tentzeris Dep., 124:4-5 (asserting that the master display could change). But this misses the point because the claims specifically require that each playback device at all times be “designed to” *both* transmit *and* determine. The heart of the claim—and one of the bases on which the Applicant distinguished the claims over the prior art—is that all of the displays at any given

time can both engage in “reciprocal” communication, Ex. 1002, 141 (arguing that unlike the asserted prior art, then-pending claim 1 required the “playback devices [to] communicate *with each other bidirectionally*, thereby enabling *independent* detection of an asynchronous playback progress within the group of playback devices ...”) (emphasis in original)), and can make determinations about whether they are in synch. Petitioner is mixing and matching configurations by suggesting that the displays can transmit when they are the non-master and determine when they are they master. The claims require each device to do both in operation.

129. Based on my review, Masumoto does not disclose a system in which any playback device (let alone all playback *devices*) is configured to perform both the transmitting and determining steps limitations [1.3b] and [1.3c] at any given time. To the contrary, Masumoto discloses a system that assigns a single master display configured *only* to determine, and one or more non-master displays configured *only* transmit. Ex. 1005, [0108], [0120], Fig. 9. That assignment occurs either at installation or when the system is powered on, and there is no disclosure of the master display being reassigned during operation. Ex. 1005, [0121], [0076]. To assign a master display, Masumoto explains that “display A210 to display D240 determines itself to be a mas[t]er display *if the measurement result of its own processing capacity is the highest, and not a master display if not the highest.*” Ex. 1005, [0124] (emphasis added). Masumoto also discloses that during the assignment process, if the

system fails to assign a master display, or mistakenly assigns more than one display as the master display, the system resets the master display, to ensure that one, and only one, display is designated as the master display. *Id.*, [0125]. Once the master display is set, the master display device receives specific video signal information from the non-master display devices, but it does not transmit its own video playback progress data. Further, the non-master devices transmit the specific video signal information, but they do not make the claimed determination. *Id.*, [0108], [0110], FIG. 9. I find that the system does not work the other way around with the master display sending its playback progress data to the other displays.

130. Petitioner claims that each of Masumoto's playback devices have the same structure—*see* Petition at 20 (arguing that “[a]ll displays have the same structure”) and citing Ex. 1005, [0040]—and so therefore each can transmit and determine as required. But that is incorrect because *each* of Masumoto's playback devices are configured where “only one master display can be set...,” based on measuring which display has the “highest processing capability” (e.g., CPU load rate), or, if all else is equal, simply which display was turned on first. Ex. 1005, [0120]-[0121], [0124]. This configuration therefore precludes any playback device to both transmit and determine as there can only be one master display at a time. For Masumoto to be similar to the system recited in the claims, all of the displays would have to be

both master and non-master all at the same time—something manifestly not disclosed by Masumoto.

131. Petitioner may go so far as to say that Masumoto meets the limitation because when the devices are powered up on Monday, one display might be chosen as the master, and when the devices are powered up on Tuesday (after being shut down Monday night), a different display might be chosen as the master. But in such a situation, Monday’s system is a different system than Tuesday’s system. In particular, as the devices start up and reconnect to each other, a new system is formed. And nowhere does Masumoto disclose changing master displays during the operation of the system.

(a) Masumoto’s master/non-master displays do not support bidirectional, specifically reciprocal, communication with each other

132. Claim element [1.3] requires that the playback devices “communicate data *with each other*,” “wherein the devices (6A, 6B) are designed: to transmit video playback progress-data ... to the other device (6B, 6A) ... [and] to determine ... whether it is in a synchronous or asynchronous playback progress with the other devices (6B, 6A).” Ex. 1001, Claim 1. A POSITA would have understood this to mean that the claim requires at least two playback devices (6A and 6B) such that device 6A is designed to transmit video playback progress-data to the other device 6B and to determine based on received progress data whether it is in a synchronous

or asynchronous playback progress with the other device 6B, AND that the other device 6B is also designed to transmit video playback progress-data to the first device 6A, and to determine based on received progress data whether it is in a synchronous or asynchronous playback progress with the first device 6A.

133. Dr. Tentzeris uses Fig. 9 to opine (incorrectly) that Masumoto teaches element [1.3]. “Masumoto teaches that the Displays (A210-C230) are designed to transmit a frame number of the video signal displayed in each display at [a] specific time to the display D240. Further, the Display 240 determines based on the received frame number whether the displays (A210-C230) is [sic] in a synchronous or asynchronous playback progress with the Display D240.” Ex. 1003, ¶ 80. As Petitioner concedes, I find that what is disclosed here is unilateral traffic—from the non-master displays to the master displays. The master display is not sending information to the non-master display, and the non-master displays are not sending data to the other non-master displays.

134. Mapping Masumoto’s Display A (210) and Display D (240) to the claimed playback devices 6A and 6B, respectively—as Petitioner and Dr. Tentzeris suggest—reveals the fallacy of Petitioner’s argument. In such instances, the claims would require that Display A (210) to transmit playback progress-data to Display D (240), *and* for Display D (240) to transmit playback progress-data to Display A (210). Then, *each* Display A (210) *and* Display D (240) would make its own

independent determination about whether the two displays are synchronized. But Masumoto does not teach this.

135. If the claimed playback device 6A is satisfied by Display A210 and claimed playback device 6B is satisfied by Display D240, then A210 would need to transmit video playback progress-data to D240. As even Dr. Tentzeris recognizes, Masumoto teaches that “display A210 ... to which display D240 requests for a notice ... send a frame number of the video signal displayed in ... display A210 to display D240.” *Id.*, ¶ 79. Display D (240)—and only Display D (240)—then determines whether the other displays are synchronized based upon the frame number they transmitted and issues a synchronization instruction when they are not. *Id.* Specifically, provided below is an annotated version of Masumoto’s process as shown in Figure 9, which depicts: (1) the “master” display (here, Display D) requesting a frame number from “[o]ther [non-master] displays” (here, Display A) (S21, in blue); (2) the non-master display(s) sending their frame number to the master display (S22, in orange); (3) the master display receiving frame numbers from the non-master displays (S23, in green); and (4) the master display determining whether there is any difference with its own frame number (S24, in green). Ex. 1005, [0108], [0110], [0113], Fig. 9.

136. Further, if 6A is Display A210 and 6B is Display D240, then, in order to meet limitation [1.3], Display A210 would also need to determine based on

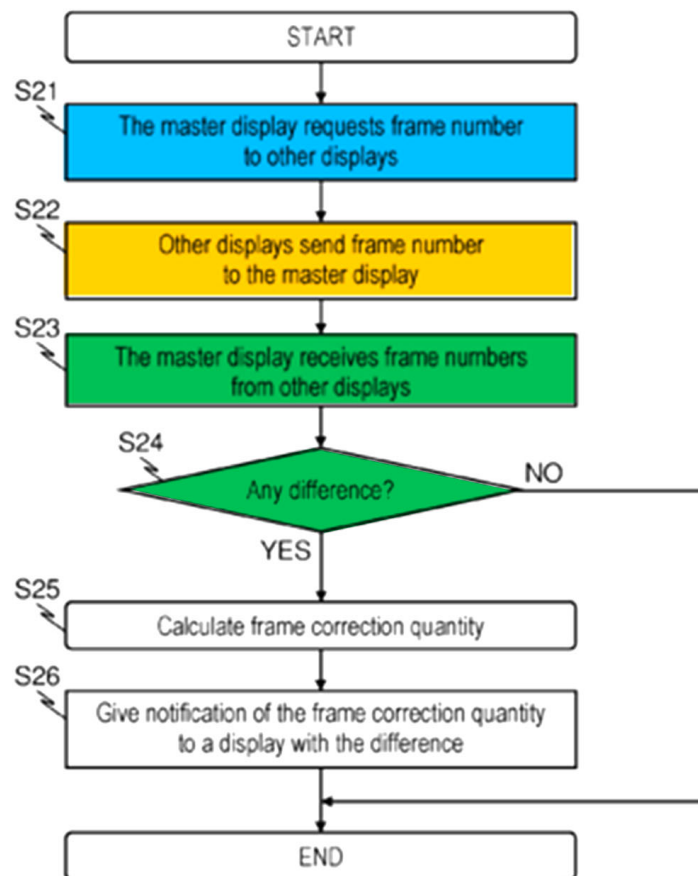
received progress data whether it is in a synchronous or asynchronous playback progress with the other device D240. Dr. Tentzeris provides no support from Masumoto (because Masumoto does not disclose it) how Display A210 would make this determination. Dr. Tentzeris cites Masumoto to opine that “display D240 notifies delayed display A210 of the frame correction quantity,” indicating that the determination is made by Display D240 and not Display A210. Ex. 1003, ¶ 79.

137. Conversely, claim element [1.3] would also require that D240 would need to transmit video playback progress-data to A210. Dr. Tentzeris provides no support from Masumoto (because Masumoto does not disclose it) how Display D240 would need to transmit video playback progress-data to A210, because the only thing Masumoto discloses in Fig. 9 that is transmitted by “Master” Display D240 to “Other” Display A210 is a “request” (S21) and a “notification of [a] frame correction quantity.” Ex. 1005, Fig. 9. Dr. Tentzeris does not identify which is the “video playback progress-data.” Is it the frame number sent from Display A210 to Display D240, or is it the frame correction quantity sent from Display D240 to Display A210? Claim element [1.3] requires the same kind of “video playback progress-data” going from 6A to 6B as going from 6B to 6A.

138. To help understand the details of Masumoto’s system, it is useful to consider Figure 9, which I have annotated. Annotated Figure 9 (below) shows the master display requesting the frame number of the other non-master displays (S21)

(blue), the non-master display(s) sending their frame number to the master display (S22) (orange), and the master display receiving frame numbers from the non-master displays (S23) (green) and determining whether there is any difference with its own frame number (S24) (green). Ex. 1005, [0108], [0110], [0113], FIG. 9.

FIG. 9



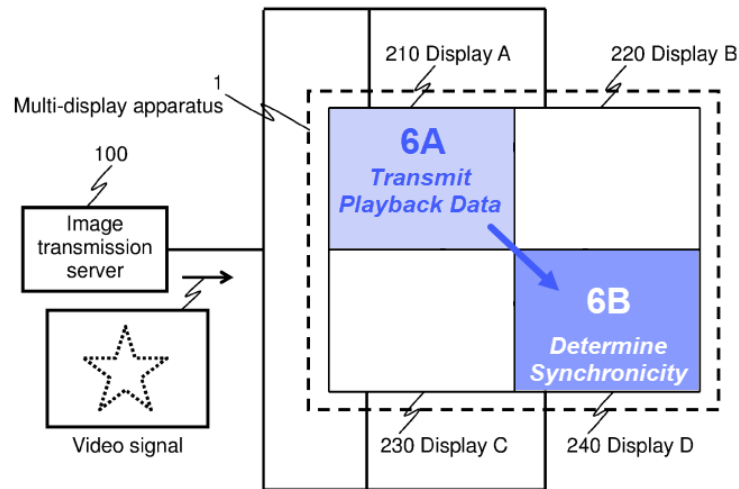
Ex. 1005, Figure 9 (annotated).

139. Although Masumoto discloses that Display D (240) transmits to Display A (210) a “request” (S21) that Display A send a frame number and a subsequent “notification of [a] frame correction quantity,” Ex. 1005, Fig. 9, neither Petitioner nor Dr. Tentzeris identifies these pieces of information as the claimed “video

playback progress-data.” Nor could they, as these are instructions on how to correct the recipient device’s playback, not a measurement of its current playback progress.

140. Only Masumoto’s master display—and not the non-master displays—“calculates a desired frame number at specific time” and “compares its calculation result with the frame number received” from other displays. Ex. 1005, [0113], FIG. 9. The master display then sends “notice of correction” to a non-master display “when the specific information received [from the non-master display] differs from specific information of a video signal that is supposed to be displayed” according to the calculation. *Id.*, [0017]; *see also id.*, [0113] (“Display D240 calculates a desired frame number at specific time notified in Step S21, and compares its calculation result with the frame number received in step S23 for each display to determine any difference (Step S24).”); *id.*, [0114]-[0116]; *id.*, [0117] (“When a frame number different from the desired frame number (difference exists) is detected (Yes in Step S24), display D240 calculates a frame correction quantity (Step S25).”); *id.*, [0118] (“Display D240 notifies delayed display A210 of the frame correction quantity calculated in Step S25 (Step S26).”).

FIG. 1



Ex. 1005, Figure 1 (annotated).

(b) Masumoto’s master display is not designed to transmit video playback progress-data to another playback device

141. Claim element [1.3] requires that each playback device is designed to “to transmit video playback progress-data via the communication stage to the other device (6B, 6A).” Ex. 1001, Claim 1. It is undisputed that Masumoto’s master display does not do this.

142. Masumoto discloses a centralized playback synchronization system in which only the “master display” “calculates a desired frame number.” The master display notifies the other non-master display devices whether to correct their own frame number based on the master display’s calculation. Ex. 1005, [0110], [0113]. But in my opinion, because only the master display makes the synchronization

determination, the master display has no reason to transmit its playback data to other non-master devices. Ex. 1005, [0108] (“[O]ne display requests other displays to notify the frame number or time stamp of the video signal displayed on each of the other displays.”), [108], [0120], FIG. 9. Simply put, Masumoto’s system works in almost precisely the opposite way than the claim system does: By allocating responsibility for making synchronization determinations to a single device—as opposed to all devices as in the system of the ’669 Patent—Masumoto’s master device has no need to, and does not, transmit its playback data to any other display.

143. Petitioner attempts to avoid this conclusion by claiming that “Masumoto discloses that the displays transmit video playback progress-data, such as the frame number or the time stamp, between each other to determine synchronization/asynchronization.” Petition, 26. But that is contrary to the express disclosures of Masumoto, which confirm that the master display does not transmit its own playback information to the non-master displays—“Other [non-master] display A210 to [non-master] display C230 to which [master] display D240 requests for a notice (Step S21) send a frame number of the video signal displayed in each display A210 to display D240 (Step S22).” Ex. 1005, [110].

144. Therefore, Masumoto’s master display does not disclose this limitation.

(c) Masumoto’s master display is not designed to determine based on the received progress data whether it is in a

**synchronous or asynchronous playback
progress with the other devices**

145. This claim element requires that each playback device is designed to “determine based on the received progress data whether it is in a synchronous or asynchronous playback progress with the other devices.” Ex. 1001, Claim 1. This limitation reflects the reciprocal nature of the communications and synchronization determination required by the claims because each display must determine whether it is in sync.

146. In my opinion, Masumoto’s master display does not do this. Masumoto’s master display “calculates a desired frame number at specific time” and “compares its calculation result with the frame number received” from other displays. Ex. 1005, [0113], FIG. 9 (Step S23); *see also id.*, [0114]-[0116], [0117] (“When a frame number different from the desired frame number (difference exists) is detected (Yes in Step S24), display D240 calculates a frame correction quantity (Step S25).”), [0118] (“Display D240 notifies delayed display A210 of the frame correction quantity calculated in Step S25.”).

147. Thus, I understand that Masumoto’s master display makes a determination regarding synchronization, but it is not the determination that claim element [1.3] requires. Specifically, this is not a determination about whether *it* is in synchronous or asynchronous playback progress with the non-master displays. Instead, Masumoto’s master display determines whether the received playback progress

information from the non-master displays is synchronous or asynchronous with a “calculated”/“desired” frame number. I find that is not the same thing as determining whether the master display itself is synchronous or asynchronous with the other device. In Masumoto’s system, the master display is always considered correct (it is never out of sync), and it only calculates whether the other device is out of sync with it.

148. Thus, it is my opinion that Masumoto’s master display does not “determine based on the received progress data whether *it* is in a synchronous or asynchronous playback progress with the other devices,” as recited in claim element [1.3]. Ex. 1001, Claim 1 (emphasis added).

(d) Masumoto’s non-master displays are not designed to determine based on the received progress data whether they are in synchronous or asynchronous playback progress with the other devices

149. Dr. Tentzeris opines that “Masumoto teaches that the Displays (A210-C230) are designed to transmit a frame number of the video signal displayed in each display at specific time to the display D240” and that “Display [D]240 determines based on the received frame number whether the displays (A210-C230) is in a synchronous or asynchronous playback progress with the Display D240.” Ex. 1003, ¶ 80. In this Fifth Exemplary Embodiment, Masumoto identifies “Display D240” as the “master display.” *See* Ex. 1005, [0108]. Dr. Tentzeris admits that the

determination whether a non-master display is “in a synchronous or asynchronous playback progress with the other devices” is made by the master display, and not by any of the non-master displays. Ex. 1003, ¶ 80.

150. Limitation [1.3c] requires that each playback device is designed to “determine based on the received progress data whether it is in a synchronous or asynchronous playback progress with the other devices.” But none of Masumoto’s non-master displays either receive progress data from anywhere or determine whether they are in a synchronous or asynchronous playback progress with other devices. Ex. 1005, [0113]-[0117], [0120], FIG. 9. Instead, only the master display receives the frame numbers from other devices, and only the master display determines whether any devices are out of sync with the desired frame number and sends a notification of correction when warranted. *Id.*, [0113]-[0117], [0120], FIG. 9.

151. Although the non-master devices transmit their frame numbers to the master display (as illustrated in Figure 9), they do not *receive* frame numbers (alleged playback progress-data, *see* Petition 25-27, 65-66) *from* the other display devices. Thus, the non-master displays cannot determine based on received frame numbers whether they are in a synchronous or asynchronous playback progress because they never receive such data from the other devices, including the master display. *See id.*, [0110], [0113], [0117]-[0118], FIG. 9. Dr. Tentzeris has not offered any suggestion to the contrary.

152. Dr. Tentzeris has testified that a non-master display (e.g., “A210”) makes a determination whether it is in synchronous or asynchronous playback progress with the other devices. Tentzeris Dep., 138:18-141:11 Dr. Tentzeris testified that because even the non-master displays still have control processors, a non-master display (e.g., “A210”) “determines” whether it is in synchronous or asynchronous playback progress. *Id.* Specifically, Dr. Tentzeris asserted that “A210 determines, by itself, whether it’s synchronized or not synchronized and readjust the video playback performance.” *Id.*, 139:4-6. I disagree. One reason is that the non-master display does not receive any communication from the master display if it is in synchronous playback progress (*see e.g.*, the flowchart in Fig. 9, which shows no notification S26 sent to a non-master display that is in synchronous playback progress), and so there would be no notification for the non-master display’s processor to process. A second reason is that the non-master processor makes no determination, and instead reacts to a notification from the master display (which does make the determination) by adjusting its playback to the desired frame according to the notification sent to it from the master display. *See* Ex. 1005, [0118]-[0119].

153. Accordingly, it is my opinion that Masumoto does not disclose that any of the non-master display devices determine “based on received playback progress data whether it is in synchronous or asynchronous playback progress with other devices,” as recited in claim element [1.3], much less how this determination is made

in response to receipt of progress data transmitted in the claim limitation above. Ex. 1001, Claim 1.

- b. Claim element [1.4]: “display devices (6A, 6B) [that] are designed to display product information or product price related information by means of virtual electronic shelf labels displayed within a section of a screen’s (5) display area overlapping with a video content or substituting a video content of said section”**

154. Element 1.4 recites that the shelf labels include a section where video content “overlaps.” This was one of the limitations on which the Examiner focused in allowing the claims. Ex. 1002, 15. Based on my understanding, Petitioner relies only on a misunderstanding of inherency in trying to show Swafford discloses it. Petition, 28-29. Instead of articulating any particular reason for believing that Swafford discloses this requirement, Petitioner broadly states that Swafford might provide overlapping information—or as Petitioner puts it, “is designed to display both static images and streaming video of products” and that “static information about Product 1 or Product 2 ... *may* overlap with a streaming video as a background,” *id.*, 28-29 (emphasis added). But the limitation is not about whether information might, in theory, overlap; it requires that it *does* overlap, and Petitioner offers nothing to show that Swafford discloses any such thing.

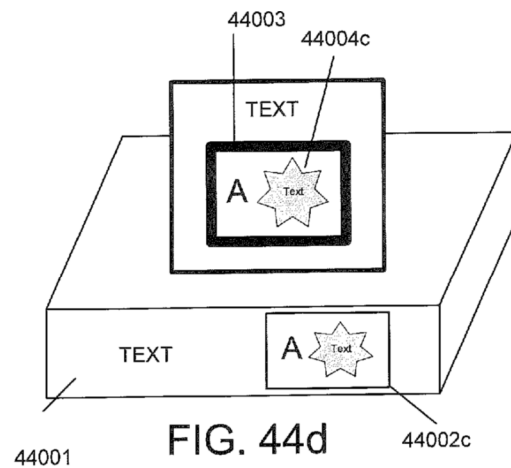
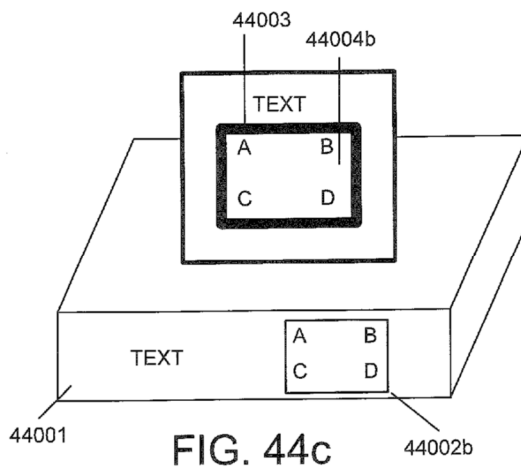
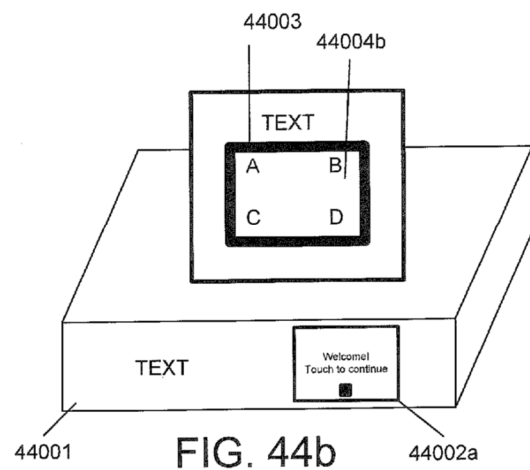
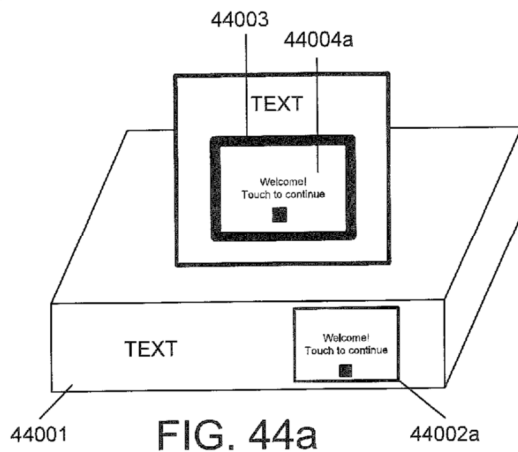
155. Petitioner says that overlap is “inherent” because “[t]he dynamic advertisement 43004 may inherently include same content as the streaming video displayed in the backgrounds of displays 43002 and 43003 by virtue of

‘advertisement.’” Petition, 29. But I it is my understanding that inherency requires that the characteristic be inevitably present—not that it merely be potentially present. I have been informed that to say that something *may* be present is by definition an admission that it is *not* inherent. But based on my understanding, possibilities are all Petitioner has.

156. From my review of the transcript of Dr. Tentzeris’s deposition, my understanding is Dr. Tentzeris was unaware of the legal standard for inherency and was not using “inherently” in the legal sense. Tentzeris Dep., 151:13-157:19, During his deposition, Dr. Tentzeris admitted that he could “not recall this term of inherency” and thus was “not aware what the meaning of inherency” was. *Id.*, 151:16-21. Therefore, I do not believe that Dr. Tentzeris’s opinion on what “may inherently” be disclosed is reliable as an opinion of a POSITA applying the proper legal standard for inherency.

157. Without overlap being either literally or inherently present, Petitioner shifts to the assertion that “a POSITA would understand that designing substitutive video contents in overlapping display areas is commonly used to ‘provide additional information to a customer or to attract a customer’s attention.’” Petition, 30 (citing Ex. 1004, [0404]). But neither Swafford nor Petitioner or Dr. Tentzeris support any such proposition.

158. As to Swafford, it provides no support for Petitioner's argument because I find that the cited paragraph has nothing to do with either substituted video or overlapping display areas. Instead, Swafford is discussing the ability for the shelf edge (44001) to work together with the product itself (44003) for the stated purpose. Ex. 1004, [0404]. Indeed, you can see that in Figures 44a-d, reproduced below.



Ex. 1004, Figures 44a-d.

159. In Swafford’s Figures 44a-d, the shelf (44001) and product (44003) are shown separately without overlap and without substituting for one another. Nor does Dr. Tentzeris meaningfully support Petitioner’s theory. Instead, he simply repeats the statements in the Petition, adding neither analysis nor expertise to the otherwise naked attorney argument. Ex. 1003, ¶ 89.

160. Because Masumoto does not disclose elements [1.3b] or [1.3c], and Swafford does not disclose element [1.4], I believe that Petitioner fails to meet its burden of showing that Claim 1, and all dependent claims, are unpatentable by a preponderance of the evidence under Ground 1.

2. Claims 7 (and therefore claims 8-10) and 11

- a. [7.1]: Masumoto does not disclose that “each device is de-signed to broadcast adjustment data for adjusting the playback progress of the devices (6A, 6B) over its communication stage if it detects an asynchronous playback progress”**

161. Claim 7 requires that “each device is designed to broadcast adjustment data for adjusting the playback progress of the devices (6A, 6B) over its communication stage if it detects an asynchronous playback progress.” Ex. 1001, 8:51–55. The ’669 Patent describes that while each device is responsible for addressing its own asynchronous progress, it is advantageous to influence other devices as well. *Id.*, 3:14-28. To do this, each device broadcasts adjustment data when it detects an asynchronous playback progress. *Id.* In the context of the specification, in my

opinion, a POSITA would have understood that “broadcast” is the sending of data to multiple recipients.

162. Petitioner ignores the “broadcasting” requirement and focuses only on the fact that, according to it, Masumoto transmits adjustment data. Petition, 41-43. In my view, however, Masumoto does not disclose broadcasting adjustment data. “Broadcast systems usually also allow the possibility of addressing a packet to *all* destinations by using a special code in the address field. When a packet with this code is transmitted, it is received and processed by every machine on the network. This mode of operation is called **broadcasting**.” Ex. 2001, 17 (emphasis in original). Instead, Masumoto discloses sending a notification of the frame correction quantity that is calculated for, and transmitted to, a particular device. Ex. 1005, [0117]-[0119], Fig. 9. “In Step S26, display A210 receiving the frame correction quantity displays a video signal of the frame number after skipping the frame correction quantity received.” *Id.*, [0118]. In my opinion, a POSITA would not understand such one-to-one communication to be a broadcast, as required by limitation [7.1].

163. Additionally, Dr. Tentzeris explained that broadcasting is all about the view of the transmitter (explaining that broadcasting “has to do with the transmission”). Tentzeris Dep., 53:22. His view seems to be that broadcasting requires the ability for a transmission to be received by multiple nodes. *Id.*, 53:14-54:10 (stating

“the whole point of the broadcast term” is the transmitter not knowing how many receivers there are).

164. Because Masumoto does not disclose element [7.1], it is my opinion that Petitioner fails to meet its burden of showing that Claim 7, or Claims 8-10 (which depend from Claim 7) are unpatentable by a preponderance of the evidence under Ground 1 (or Ground 2, which simply references Ground 1 for this limitation).

**b. [11.1]: Neither Masumoto nor Swafford discloses
“wherein the communication stage is designed to use
UDP multicast data packets for the communication”**

165. Claim 11 requires that “the communication stage is designed to use UDP multicast data packets for the communication.” For Ground 1, Petitioner relied heavily on Masumoto for the disclosure of the communication stage for element [1.3], Petition, 25-27. Here, Petitioner relies entirely on Swafford and the knowledge of a POSITA to show this limitation is met, Petition, 46. Petitioner is incorrect.

166. For its contention that Swafford discloses UDP, Petitioner cites Swafford’s disclosure that it may use a wired communication path, through a network. Petition, 46 (citing Ex. 1004, [0274]). From this limited disclosure of a wired network, Petitioner asserts that element [11.1] is met because “UDP is a well-known communication protocol.” *Id.*

167. But being a well-known protocol is not enough to show that a POSITA would use UDP in Swafford (or Masumoto). Petitioner’s expert relies on Kipp (a

reference not used in Ground 1) to show that UDP is a well-known protocol. Ex. 1003, ¶ 137. But as Dr. Tentzeris acknowledged, Kipp recites numerous network protocols suitable for video delivery, including TCP/IP, HTTP/1.1, and HTTP/2.0. *Id.* (citing Ex. 1006, [0129]). Dr. Tentzeris stated that there are reasons to choose TCP/IP over UDP and that he would normally use TCP/IP. Tentzeris Dep., 62:2-5, 64:3-9, 66:24-67:2, 68:19-22. For example, during his deposition, Dr. Tentzeris noted that “UDP does not have some security features that TCPIP do[es] have.” *Id.*, 66:24-25. Thus, Dr. Tentzeris admitted that TCP/IP is the “most common” protocol. *Id.*, 62:2-3. I find that neither Petitioner nor its expert provides any rationale for why a POSITA would choose UDP over any other communication protocol, including those listed in Kipp. Moreover, Petitioner conflates communication for downloading video content—which is all the cited section of Kipp addresses—and communication of progress data—which is what is required of the communication stage claimed in the ’669 Patent. These are two different types of communication. Importantly, the ’669 Patent discloses a system where video is already downloaded to the playback devices. Ex. 1001, 2:15-28. “[I]t is of particular advantage that [the system] comprises a video distribution server for distribution of the video data to the devices, in particular the entire video data of a video upfront to playback start at the devices.” *Id.*, 2:15-18. Therefore, in my view, the communication protocol a POSITA might use for transmitting video is irrelevant. Instead, what matters is what communication

protocol a POSITA would use for transmission of the data required by the challenged claims, including progress data. Petitioner provides no reason why a POSITA would have found it obvious to use UDP for transmitting progress data in Swafford or Masumoto.

168. Based on my review, even were Kipp's disclosure relevant (it is not), it discloses only UDP communication, and does not disclose using UDP *multicast* data, as required by this limitation. UDP is capable of unicasting and broadcasting data, in addition to multicasting data. *See* Unicast UDP Usage Guidelines for Application Designers, RFC 5405, Networking Working Group ("RFC 5405"), *available at* <https://abdn.elsevierpure.com/en/publications/unicast-udp-usage-guidelines-for-application-designers>. "Point-to-point transmission with exactly one sender and exactly one receiver is sometimes called unicasting," while multicasting is defined as "transmission to a subset of the machines." Ex. 2001, 17 (emphasis omitted). In his deposition, Dr. Tentzeris admitted that UDP is capable of unicasting or multicasting data. Tentzeris Dep., 50:25-51:2, 62:19-21. Use of unicast in UDP communication is the most common case. In my opinion, Petitioner provides no rationale for a motivation to use multicast data over any other form of UDP data. In fact, as would be understood by a POSITA, UDP for unicast transmission "is the most common case." RFC 5405. Using UDP for multicast is a "specialized application[]." *Id.*

169. Because Dr. Tentzeris has failed to show how element [11.1] is met, Petitioner fails to meet its burden of showing that Claim 11 is unpatentable by a preponderance of the evidence under Ground 1

C. A POSITA would not have been motivated to combine Masumoto and Swafford

170. In my opinion, even if the Swafford/Masumoto combination disclosed all limitations of the challenged claims (and in my opinion, it does not), Dr. Tentzeris has not shown that there would have been a motivation to combine Swafford and Masumoto. Based on my review, Swafford and Masumoto disclose very different systems. Swafford discloses small displays on shelves and on products in a merchandising setting, whereas Masumoto discloses a large multi-display apparatus. *Compare* Ex. 1004, Fig. 43, *with* Ex. 1005, Fig. 1. Further, while Masumoto focuses on synchronization between the displays, *see, e.g.*, Ex. 1005, [0102]-[0126], Swafford does not even recognize synchronization as an issue to be addressed. I find that Dr. Tentzeris fails to provide a cohesive argument for why a POSITA would have been motivated to combine Swafford and Masumoto, or how such a combination would work. Instead, Dr. Tentzeris takes a scattershot approach to motivation to combine. But, as I describe below, each rationale is fatally flawed.

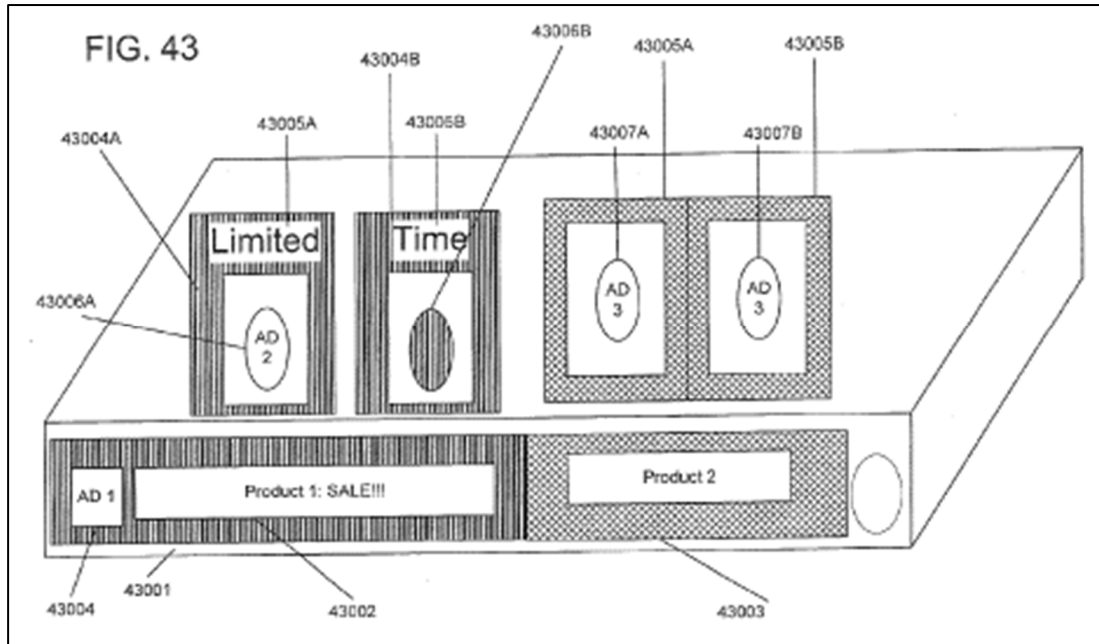
171. Dr. Tentzeris opines that “[a] POSITA would have been motivated to implement Masumoto’s display displays, [sic] in Swafford’s system, as described

above, for the following reasons.” Ex. 1003, ¶ 152. I disagree and disagree below with each of the reasons opined by Dr. Tentzeris.

172. Dr. Tentzeris first opines that “Swafford and Masumoto are designed to achieve the same goal to synchronize a video across multiple displays.” *Id.*, ¶ 153. I disagree. Dr. Tentzeris further opines that “a POSITA would have been motivated and able to use the teaching of Masumoto modify [sic] Swafford in order to fulfill Swafford’s express objective of “simultaneously output[ing] a different portion of the streaming video.”” *Id.*, ¶ 154 (citing Ex.1004, [0423]). But Swafford’s Fig. 28 shows that its system is designed around “a main hub 28225” which is disclosed as “some type of central processing server configured to accommodate transmission of communications between various backend components of a retailer's network, such as ... a database 28223 and from a backend to a storefront end, such as to continuous display shelf edge label devices” Ex. 1004, [0276]. A POSITA would have understood this configuration to disclose a single central server accessing video from a database. A POSITA would have also been aware of “[a] known video play back system [that] comprises a central server for distributing a video stream to a number of devices” capable of “[s]ynchronized playback ... by controlling the playback at the playback devices with a highly precise and system wide timing signal delivered by the server or by a system wide synchronized clock signal available within the playback devices.” Ex. 1001, 1:20-27. Since such systems for synchronized

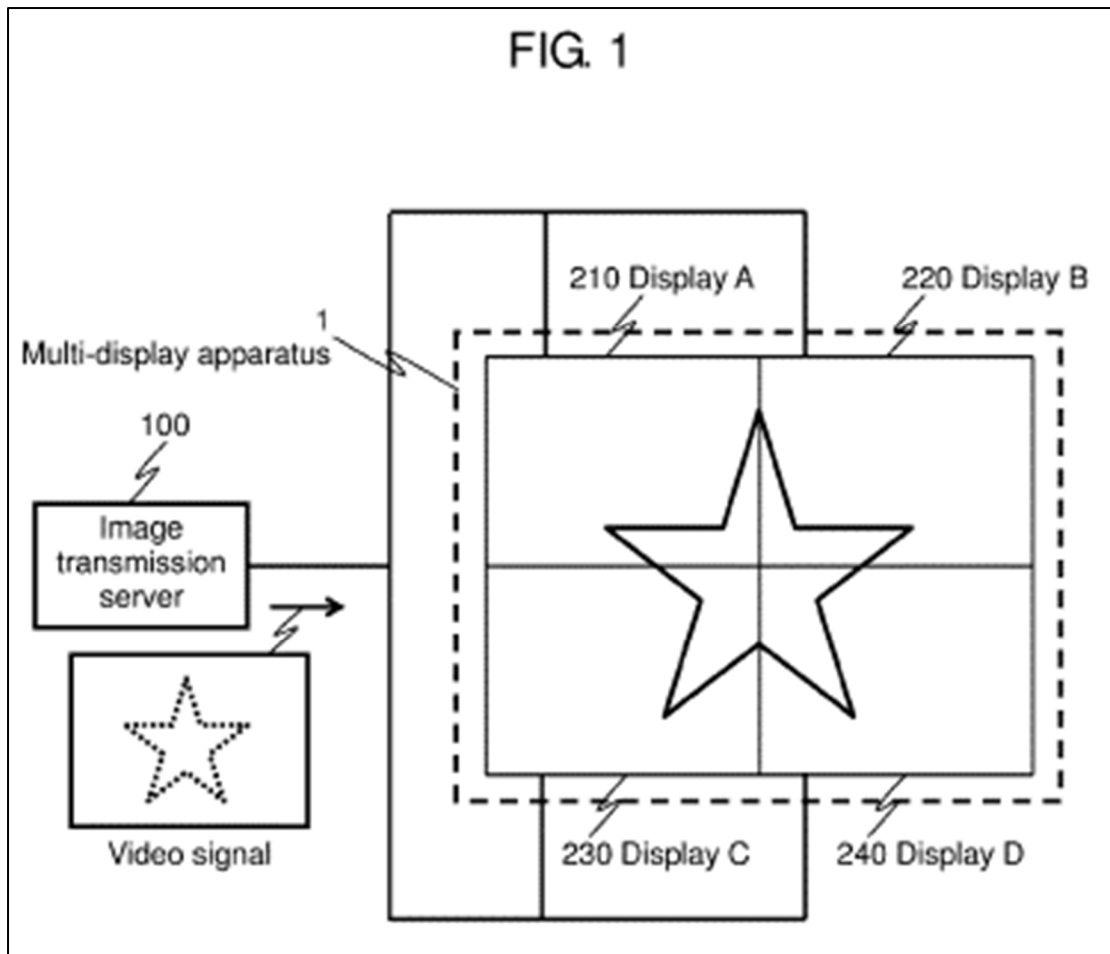
playback on multiple video devices from a central server already existed and were known to a POSITA, a POSITA would not have needed Masumoto to “simultaneously output a different portion of the streaming video” in Swafford’s displays.

173. I find that the displays contemplated by Swafford and Masumoto are fundamentally different and involve different considerations. Swafford relates to a “merchandizing display” with “a continuous display formed by electronic displays embedded along product shelves and on the packages.” Ex. 1004, Abstract. Swafford’s merchandizing displays “can be provided with any number of displays.” *Id.*, [0388]. As shown in Figure 43 (below), I understand that these continuous displays may each have a wide but very short aspect ratio, and they may be attached to each other lengthwise, effectively making them even wider. Further, Swafford contemplates displaying video “on the packages” themselves. Ex. 1004, Abstract. In my view, the packages shown in Fig. 43 have a completely different aspect ratio than the shelf labels and include a different number of pixels per screen.



Ex. 1004, Figure 43.

174. Masumoto, on the other hand, contemplates “video wall systems and signage systems,” such as what one might see in a sports bar or displaying a fast-food menu. Ex. 1005, [0148]. In Masumoto, the video server “sends same video signal to each of display A210 to display D240 simultaneously.” *Id.*, [0039]. “Each of display A210 to display D240 cuts out and displays a portion in charge from the received image. By combining four displays A210 to D240, a single image is displayed.” *Id.* This is shown in Fig. 1 (below).



Ex. 1005, Figure 1.

175. The only “specific information” Masumoto adds to its video signal is a “time stamp,” “frame number,” or “time sample;” Masumoto discloses nothing related to adjusting to the differing aspect ratios or differing numbers of pixels per screen because Masumoto assumes the displays are all the same. *Id.*, [0107].

176. The two references, thus, are not directed to the same goal. I find that Masumoto involves simple video processing using uniform displays and a network server to expand the size of a streaming video from covering one screen to covering four, whereas Swafford pieces together streaming video segments having different

widths and heights. It is my opinion that Dr. Tentzeris has not shown that a POSITA would have had any motivation to use Masumoto to improve upon Swafford, as they are directed to fundamentally different problems.

177. Dr. Tentzeris also claims that Swafford’s “express objective” was to “simultaneously output a different portion of the streaming video,” and that satisfying that objective would have motivated a POSITA to combine Swafford and Masumoto. Ex. 1003, ¶ 154 (citing Ex. 1004, [0423]). In my opinion, this is also incorrect. Indeed, Swafford already satisfies this objective by providing “a system for forming a continuous display along” electronic label devices positioned along product shelves. Ex. 1004, [0423]. Dr. Tentzeris never explains why a POSITA would be motivated to look outside Swafford to solve a problem Swafford expressly solves.

178. Dr. Tentzeris says that there was “a well-recognized need in synchronizing video displays—a need for low bandwidth and simple, inexpensive hardware.” Ex. 1003, ¶ 155. But even if true, Swafford expressly discloses that his systems can be implemented with “off-the-shelf” components. Ex. 1004, [0257]. Thus, I find that Swafford itself belies Petitioner’s supposed well-recognized need.

179. Unable to show a motivation to combine from the references themselves, Dr. Tentzeris relies on hindsight and two references not raised in Ground 1—Yamada (Ex. 1010) and Kipp (Ex. 1006). Ex. 1003, ¶ 155. In doing so, Dr. Tentzeris provides evidence that the invention in the ’669 Patent is just inexpensive and

Yamada is just simple. Dr. Tentzeris is only able to say that Kipp is functional. Dr. Tentzeris attempts to suggest that Masumoto is also simple, but quotes a passage not found in the cited Masumoto paragraph. Furthermore, both paragraphs are drawn from Masumoto's second embodiment, and not the fifth embodiment Dr. Tentzeris uses this to allege obviousness against the '669 Patent. Nevertheless, Dr. Tentzeris provides no evidence that Yamada, Kipp nor Masumoto "lower bandwidth." Additionally, according to Dr. Tentzeris, Yamada identifies a similar problem to that solved by the '669 Patent, but that is irrelevant to any motivation for a POSITA to combine two other references (Swafford and Masumoto). *Id.* Further inapposite to an explanation of the Swafford-Masumoto combination, Yamada is a system for streaming video to multiple "video information reproduction devices." Ex. 1010, [0100]-[0101]. Kipp discloses similar, streaming video to "multiple premises 102 (e.g., businesses, homes, consumer dwellings, etc.)." *See* Kipp, Ex. 1006, [0028]. These references have nothing to do with electronic shelf labels, and certainly do not demonstrate any well-recognized need.

180. It does not matter that both Swafford and Masumoto discuss LCD displays. Ex. 1003, ¶ 156 (citing Ex. 1004, [0330]; Ex. 1005, [0040]). I find that is irrelevant; none of the purported examples offered by Dr. Tentzeris for ways to improve the LCD screens have anything to do with the LCD screens themselves. For instance, Dr. Tentzeris points to the ability to have "different displays communicate

with each other to synchronously display a video.” *Id.* By my review, that has nothing to do with whether the display is an LCD or anything else. Nor does the fact that Masumoto’s displays may “transmit[] specific information of a video signal displayed on the display at specific time, using frame numbers as the specific information, broadcasting the frame correction quantity to implement synchronization, loading the video data upfront to play, transmitting the video data as compressed data, transmitting the specific information repeatedly, [and] embedding the frame correction quantity in a synchronization command.” *Id.* In my view, these supposed improvements have nothing to do with the LCD screens, and thus, these cannot constitute motivations to improve Swafford’s LCD with Masumoto’s LCD. Furthermore, the LCD display disclosed by Swafford is used in its central hub, not in its electronic shelf labels. *See* Ex. 1004, [0303]. Also, a Google Patents search for “LCD display” for priority dates from May 15, 2015 (Swafford) to Oct. 11, 2016 (Masumoto) reveals that over 100,000 other options could have been selected under this criteria.

181. Dr. Tentzeris’s fourth reason alleges that “a POSITA would have been readily able to incorporate Masumoto’s displays that transmit video playback progress-data (e.g., frame numbers) and Masumoto’s memory that stores video data representing the video into Swafford’s electronic label devices with an expectation of success.” Ex. 1003, ¶ 157. Dr. Tentzeris tries to support this reason by stating that

“Swafford’s electronic label devices all play the same role in the ’669 Patent as synchronously displaying advertisement videos in the existing video playback art” and then “[a]ccordingly, it would have been routine for a POSITA to combine or modify the Swafford’s electronic label devices to arrive at the purported invention of the ’669 Patent,” but these statements speak of Swafford and the ’669 Patent, and not of Swafford and Masumoto. *Id.* Neither of these statements support Dr. Tentzeris’s allegation that a POSITA would have a reasonable expectation of success in incorporating Masumoto’s displays and memory into Swafford’s electronic label devices. Dr. Tentzeris does not provide any details of how Masumoto’s display processors and memory would be integrated into Swafford’s shelf displays. Swafford’s system is designed to operate from a central processing hub, allowing the displays to be inexpensive additions to the shelf systems. A POSITA would have understood that incorporating Masumoto’s additional per-display processors and memories would greatly increase the power usage, heat generation and cost of each shelf display. These drawbacks would not be justified, as there would be no need for shelf displays to determine which is the master since there is already a well-defined hub processor connected to all of the shelves in Swafford’s design.

182. I have reviewed Petitioner’s expert’s analysis and found that it does not add anything. The expert simply parrots the analysis in the petition, providing no material explanation at all. *Compare* Petition, 52-56 (citing “First” through “Fourth”

motivations for combination), *with* Ex. 1003, ¶¶ 152-58 (parroting the “First” through “Fourth” motivations for combination).

183. Even assuming Swafford and Masumoto do share some “structural similarity”—which they do not—this does not sufficiently support Petitioner’s alleged motivation to combine. Ex. 1003, ¶ 156. I have been informed that under the legal standard, the obviousness inquiry asks whether a POSITA would have been motivated to combine the references, not if they could, which is at most what is shown by Petitioner.

184. For these reasons, Dr. Tentzeris fails to show that a POSITA would have been motivated to combine Swafford and Masumoto. As such, I find that Ground 1 fails.

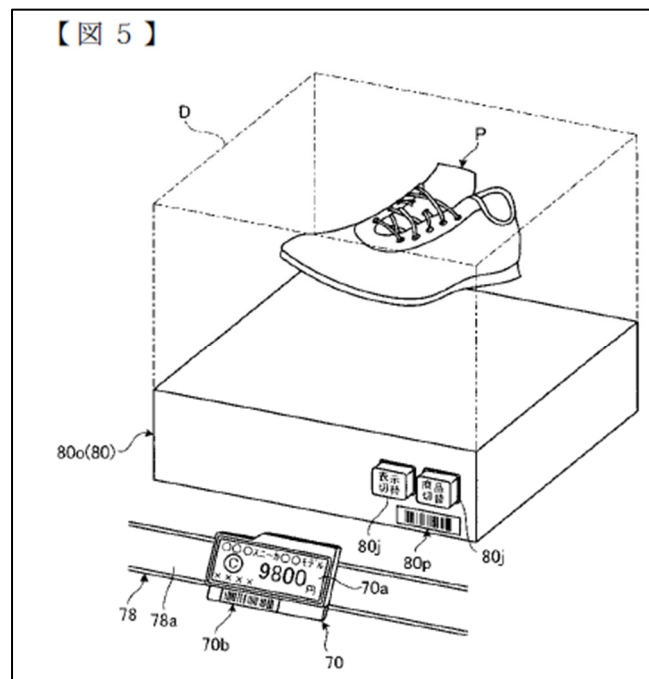
X. GROUND 2: Masumoto/Kipp/Takashi

A. Summary

1. Takashi (Ex. 1007 (Original), Ex. 1008 (Translation))

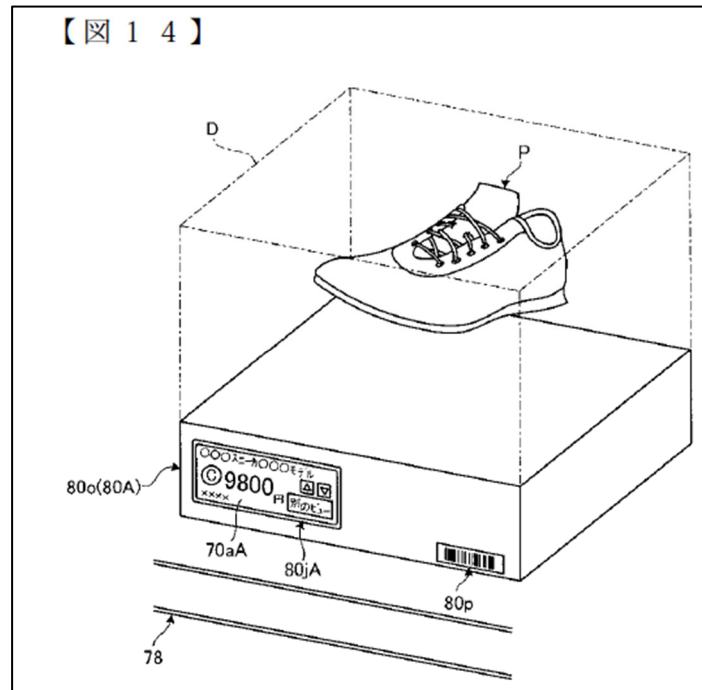
185. Takashi discloses a “merchandise information display system.” Ex. 1008, Abstract. The system includes an image display terminal 80 with display area D for displaying merchandise. Ex. 1008, [0020]. “[T]he image display terminal 80 is provided with a display area D that is larger than the display portion 70a of the shelf tag terminal 70 . . . and this display area D displays images P relating to the merchandise” *Id.* That display area can either be a three-dimensional display, or a set of two-dimensional displays, such as showing different perspectives of the

merchandise on different sides. The display area (D) sits on a housing (80o, which is also part of image display terminal 80). The image—a shoe for example—is shown above a separate shelf tag terminal 70 affixed to a shelf 78 for displaying the name and price information of the merchandise. *Id.*, [0019]-[0020]. “[T]he shelf tag terminal 70 is provided with a display portion 70a that displays information including text information relating to merchandise such as merchandise name and price on the front side of the thin plate (label-shaped) housing, and a terminal code display portion 70b that shows a barcode as the terminal code.” *Id.*, [0019]. This system is shown in Figure 5 (below). Ex. 1007, Fig. 5 (original Japanese application document); Ex. 1008, [0019]-[0020] (English translation).



Ex. 1007, Figure 5.

186. Takashi also discloses a different embodiment, where the “text information about the merchandise” is shown on a display portion 70a mounted on the housing 80o. *Id.*, [0051], Fig. 14 (below).



Ex. 1007, Figure 14.

B. The Masumoto/Kipp/Takashi Combination Does Not Disclose Several Limitations of the Challenged Claims

1. Claim 1 (and therefore all challenged claims)

187. As with Ground 1, Dr. Tentzeris relies solely on Masumoto in Ground 2 to teach limitations [1.3b] and [1.3c]. For limitation [1.4], Petitioner relies on Takashi. That limitation requires, in part, display devices that display “product information or product price related information” “overlapping with a video content or

substituting a video content.” But because Takashi has entirely separate sections for video content and product information, Dr. Tentzeris proposes an understanding of Takashi that is not how a POSITA would see it. Further, Dr. Tentzeris takes a scattershot approach to motivation to combine, without taking into account how a POSITA would consider the references.

- a. **Claim element [1.3]: “and a communication stage to communicate data with each other, wherein the devices (6A , 6B) are designed: to transmit video playback progress-data via the communication stage to the other device (6B , 6A); and, to determine based on the received progress data whether, it is in a synchronous or asynchronous playback progress with the other devices (6B , 6A)”**

188. For Ground 2, Petitioner relies solely on its discussion of Masumoto in Ground 1 for limitations [1.3b] and [1.3c]. Petition, 65. In my opinion, for the same reasons detailed for Ground 1, Masumoto does not disclose any playback devices that satisfy limitations [1.3b] and [1.3c].

- a. **[1.4]: Neither Kipp nor Takashi discloses a system “wherein the display devices (6A, 6B) are designed to display product information or product price related information by means of virtual electronic shelf labels displayed within a section of a screen’s (5) display area overlapping with a video content or substituting a video content of said section”**

189. Element 1.4, requiring the virtual electronic shelf label to be within a section of the display area, and overlapping or substituting for video content, was one of the limitations the Examiner cited in allowing the claims. Ex. 1002, 15.

Petitioner asserts that a “POSITA would have been motivated to implement the video content displayed on Kipp’s multiple playback devices and the product content displayed on Takashi’s image display terminal, in Masumoto’s multiple displays when applying Masumoto’s multiple-display apparatus in a specific business premise.” Petition, 71. Such a combination would not make sense to a POSITA. And the combination would fail to meet element [1.4] because it fails to teach overlapping with video content or substituting for video content.

i. Kipp does not disclose electronic shelf labels

190. Kipp discloses playing content on multiple screens in, for example, a sports bar, classroom, or meeting room. Ex. 1006, [0036]. Based on my review, Kipp does not disclose virtual electronic shelf labels, much less shelf labels within a different display overlapping with or substituting for video content. While Takashi discloses a shelf label, I find that it does not disclose such a label’s screen overlapping with or substituting for video content. Takashi actually shows just the opposite—no overlap between the display area of the label and any other display area. *See, e.g.*, Ex. 1007, Figs. 5, 14.

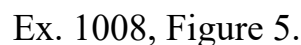
191. Kipp discloses playing content on multiple screens in, for example, a sports bar, classroom, or meeting room. Ex. 1006, [0036]. I did not find anywhere that Kipp disclosed any virtual electronic shelf labels, much less shelf labels within a different display overlapping with or substituting for video content. Therefore, Dr.

Tentzeris ignores the disclosures of the references themselves, and instead tries to fabricate the disclosure it needs to show the limitation is met.

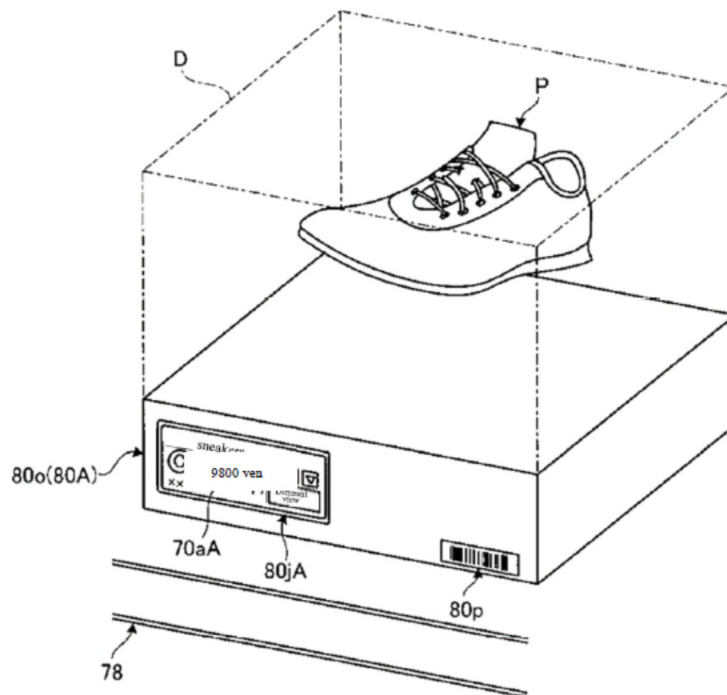
ii. Kipp does not disclose claim element [1.4]

192. Dr. Tentzeris attempts to fill in the blanks in Kipp by manufacturing his own disclosures. Dr. Tentzeris claims that if the system of Kipp were installed “in a business premise, such as a retail store setting, the content associated with the premise will include product information.” Ex. 1003, ¶ 178. But Kipp itself makes no such disclosure and Petitioner cites none. Indeed, while Kipp refers to particular locations where its system might be installed—“sports bars, classrooms, [and] meeting rooms,” Ex. 1006, [0036]—I did not find any reference to any “business premise” or “retail store setting.” And based on my review, it certainly does not refer to including “product information” were it installed in such a setting. Nor does Dr. Tentzeris have any evidence that a POSITA would have thought to install Kipp’s system in such a premise or to include “product information” when it did so. Instead, Dr. Tentzeris provides only the conclusory opinion of its expert, which simply parrots the bare assertions in the Petition. I understand that the legal standard dictates that conclusory expert testimony cannot suffice as the only support of an obviousness determination. Nor does Petitioner explain how or why—even presuming Kipp were used in circumstances not disclosed in the reference itself—“product information” would be displayed within a section that overlaps with or substitutes for

193. Dr. Tentzeris manufactures a view of Takashi that is not how a POSITA would understand it Takashi discloses two embodiments: The Figure 5 embodiment and the Figure 14 embodiment. Neither meets element [1.4]. Takashi's Figure 5 embodiment, shown below, has two entirely separate displays, a "shelf tag terminal 70," potentially displaying product and/or price information and an "image display terminal 80," potentially displaying video content. Ex. 1008, [0019]-[0021]. Notwithstanding Petitioner's assertion to the contrary, Petition, 70, I understand that there is no overlap between these two display sections, as required by element [1.4].



194. The Figure 14 embodiment, shown below, includes two display portions—70aA potentially displaying product or price information and D potentially displaying video—on a single terminal. Ex. 1008, [0051]. In addition, display portion 70aA (and the associated input operation unit 80jA) are not on the merchandise display shelf 78, and therefore is not a “virtual electronic shelf label” as required by limitation [1.4].

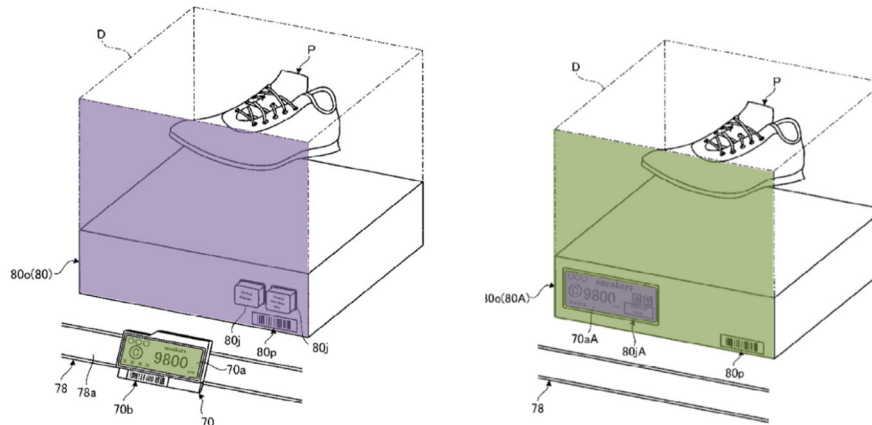


Ex. 1008, Figure 14.

195. But even though these display portions are on the same terminal, I find that there is no indication that there is overlap between them. To the contrary, in my opinion, a POSITA would understand that the bottom part of the terminal is the

housing (80o), which includes discrete display sections 70aA and 80p that are separate from display section D. *Id.*, [0021].

196. In order to show Takashi as meeting element [1.4], Petitioner and Dr. Tentzeris provide the following annotated images of Takashi's Figures 5 and 14.



Petition, 68-69; Ex. 1003, ¶¶ 179, 180.

As can be seen from the purple shading of Figure 5 and the green shading of Figure 14, Petitioner is asserting that Takashi's entire device, including the housing (80o) at the bottom, is covered by display (D). Dr. Tentzeris reiterated this at this deposition. Tentzeris Dep., 167:15-168:16 ("And then a display portion D would be the whole system allowing videos...."). Dr. Tentzeris went so far as to say it would be "quite impractical" to have the display end at the solid line indicating the housing (80o). *Id.*

197. A POSITA would understand the display (D) to end at the housing (80o), and not to cover the entire device. Under this proper understanding of Takashi's figures, Petitioner cannot show that element [1.4] is met because the

purported virtual electronic shelf labels (shelf tag 70, according to Petitioner, Petition, 68) are not displayed within the purported screen (display (D)) and do not overlap or substitute for any video content.

198. Dr. Tentzeris relies on both Fig. 5 and Fig. 14 to show that limitation [1.4] is met. Ex. 1003, ¶¶ 179, 180; *see also* Tentzeris Dep., 173:14-176:24. During his deposition, when asked to clarify that he is “relying on both figure 5 and figure 14 of Takashi,” Dr. Tentzeris asserted that he “list[ed] that on paragraph 181 saying that . . . figure 5 [and] figure 14 are embodiments [with] . . . almost identical configurations.” *Id.*, 176:18:24. In my opinion, however, these figures represent mutually exclusive embodiments. Fig. 5 shows the shelf tag terminal 70 on the merchandise display shelf 78. Fig. 14, on the other hand, shows the shelf tag terminal 70 on the image display terminal 80, and not on the shelf itself. I do not believe there is a way to have an embodiment that both has the shelf tag terminal 70 on the shelf and also have shelf tag terminal 70 not on the shelf. Dr. Tentzeris does not explain how he is using both embodiments and whether he is relying on some combination of these embodiments, or is saying that either embodiment meets limitation [1.4].

199. Dr. Tentzeris opines incorrectly regarding Takashi’s Fig. 14 embodiment, “that the first display portion 70aA corresponds to a virtual electronic shelf label within a section of the display portion D overlapping the video in [1.4].” Ex. 1003, ¶ 180. Dr. Tentzeris makes a similar statement about the extent of display

portion D in Takashi's Fig. 5. *Id.*, ¶ 179. Dr. Tentzeris's error comes from misunderstanding "display portion D" to be the entirety of Fig. 14's "display terminal 80A," and not just the upper portion as Takashi intended and a POSITA would have understood.

200. Dr. Tentzeris's declaration does not provide any explanation for why he believes display portion D extends over the entire device. Dr. Tentzeris did, however, testify at his deposition about why he believed display portion D extended over the entirety of the device. But none of his testimony is sufficient support for his opinion.

201. First, Dr. Tentzeris testified that the fact that Takashi describes display portion D as "larger" than display portion 70a was evidence that display portion D covered the entire device. Tentzeris Dep., 163:18-164:25. But a POSITA would understand that something being larger than other something else does not imply it encompasses the other thing. A house is generally larger than a dorm room. But that does not imply that the dorm room is in the house.

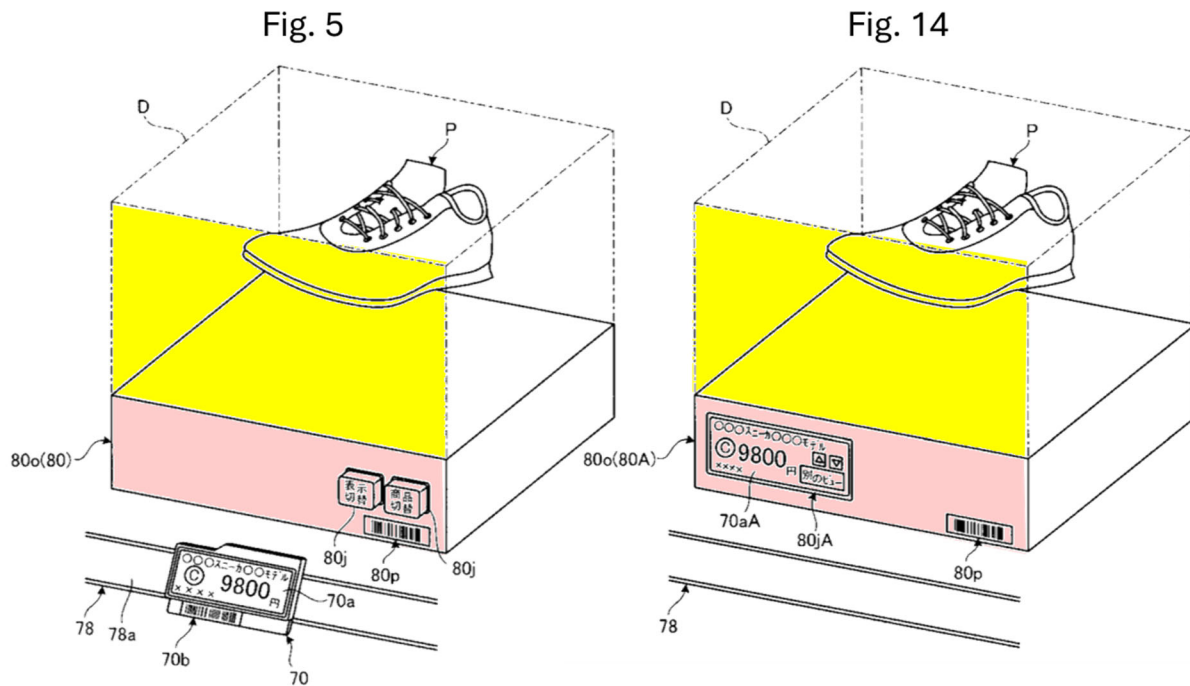
202. Second, Dr. Tentzeris testified that it would be "impractical" in terms of "efficiency" to utilize only the upper part of the device for display portion D. Tentzeris Dep., 168:8-13. I disagree. A POSITA would understand that covering an entire device with a display screen would be more difficult than having a particular section designated for the display. This is especially true when looking at Fig. 5,

which has mechanical switches (“input operation portion”) 80j on the device. Incorporating such switches onto the top of a continuous display is actually complex engineering task. And it would be much simpler, and more efficient, to have a designated section of output (display) and a designated section for input (switches).

203. Third, Dr. Tentzeris seems to misunderstand the use of “portion” in the English translation of Takashi. Dr. Tentzeris points to the fact that there are two “display portions,” as meaning that there are two portions of a display. Tentzeris Dep., 169:4-16 (explaining that the “display portions [are] . . . part of the same display”). But looking at other uses of “portion” in the English translation of Takashi shows that “portion” means portion of the device as a whole. For example, Takashi refers to a server with a “storage portion 106 such as a hard disk....” Ex. 1008, [0016]; *see also id.*, [0024], [0025]. A POSITA would understand that this refers to a portion of the server that is providing storage. As another example, the reference to “input operation portion 80j” is clearly a reference to a portion of the device meant for input operation. *Id.*, [0021]; *see also id.*, [0044]. Similarly, a POSITA would understand “display portion” to refer to a portion of the device that is a display.

204. As shown below in my annotated versions of Takashi’s original Figs. 5 and 14, Takashi intended and a POSITA would have understood only the yellow shaded portion in each figure to be the “display portion D” and the pink portion in each figure to be the “housing 80o,” and together the union of the yellow and pink

portions in each figure (what Dr. Tentzeris indicates with purple in his annotated Figure 5 and green in his annotated Figure 14) comprise the entire “display terminal” labeled “80” in Fig. 5 and “80A” in Fig. 14.

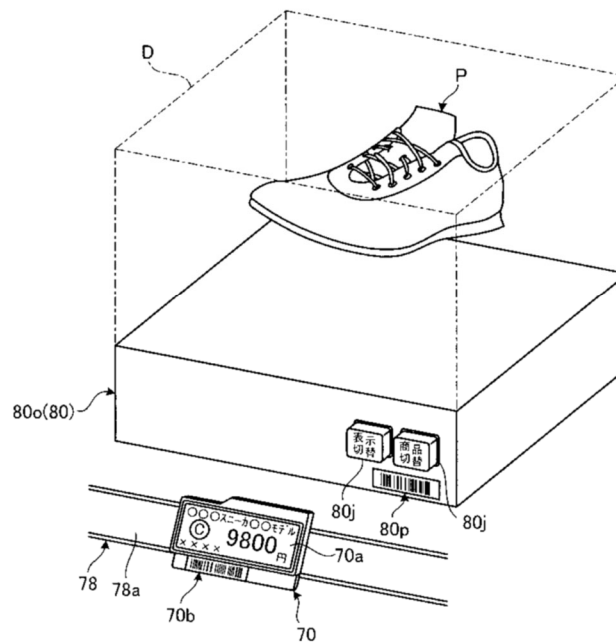


Ex. 1007, Figs. 5, 14 (annotated)

205. In Fig. 5, Takashi uses the label “80” to refer to the entire region that Dr. Tentzeris shows in purple, and this entire region is separated into two distinct and disjoint portions: the upper “display area D” and the lower “housing 80o.” I have reproduced below Fig. 5 from Ex. 1007, the original (untranslated) version of Takashi. Even though this patent is in Japanese, the figure and its description in the Takashi specification refer to figure labels using English numerals and letters. Dr. Tentzeris quotes Takashi’s statement that “[a]s shown in FIG. 5, the image display

terminal 80 is provided with a display area D that is larger than the display portion 70a of the shelf tag terminal 70 ..., and this display area D displays images P relating to the merchandise.” Ex. 1003, ¶ 179 (citing Ex. 1008, [0020]). However, Dr. Tentzeris does not quote Takashi’s subsequent statement that “[i]n addition, in the present embodiment, a housing 80o of the image display terminal 80 is provided with a terminal code display portion 80p ..., and an input operation portion 80j” Ex. 1008, [0021].

【 図 5 】



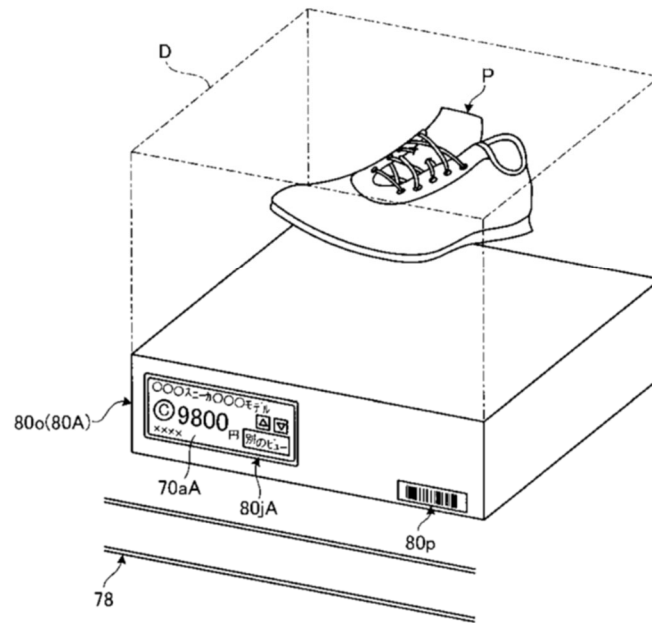
Ex. 1007, Fig. 5.

206. Even under Dr. Tentzeris’s—in my opinion, incorrect—view that display portion D of Fig. 5 extends to include covering all of housing 80o, Fig. 5 cannot meet the requirement of limitation [1.4] that the virtual electronic shelf label is

displayed within a section of a screen's display area overlapping with a video content or substituting a video content. In Fig. 5, the shelf tag terminal 70 containing display portion 70a (the purported virtual electronic shelf label) is not displayed within display portion D, but is entirely separate, being mounted to the shelf below the video display terminal.

207. Fig. 14 is a "variation" of Fig. 5 (*see* Ex. 1008, [0051]). Takashi intended, and a POSITA would have understood, that Fig. 14's "display portion D" refers only to the upper portion of "display terminal 80A." The lower portion of "display terminal 80A" is labeled "80o" identically with its labeling in Fig. 5, where it is identified as a "housing" that is distinct and disjoint from the "display portion D." For reference, I have reproduced below Fig. 14 from Ex. 1007, the original (untranslated) version of Takashi.

【 図 1 4 】



Ex. 1007, Fig. 14.

208. Therefore, as Takashi does not disclose playing video other than in display section D, and certainly not within the housing 80o, on display sections 70aA and 80p are mounted, Figure 14 does not provide the necessary overlap or substitution required by element [1.4].

209. Given that Takashi's shelf tags (the purported virtual electronic shelf labels) are not displayed within display section (D), Petitioner tries another tack: Asserting that display section D—not display section 70aA or shelf tag 70—is itself an electronic shelf label. Petition, 70. But this is supported by nothing but the conclusory opinion of its expert. In my opinion, Takashi discloses a discrete component as the shelf tag terminal. For Figure 5, this is “shelf tag terminal 70.” Ex. 1008,

[0020]. For Figure 14, Takashi describes that “first display portion 70aA” contributes the shelf label component in “integral combination of the tag label terminal 70 and the image display terminal 80.” *Id.*, [0051]. I find that Takashi never discloses using display section D as a shelf label, and a POSITA would not understand it to be a virtual electronic shelf label, as required by element [1.4].

210. Dr. Tentzeris opines that “a POSITA would understand that designing substitutive video content in overlapping display areas is commonly used to ‘provide additional information to a customer or to attract a customer’s attention.’” Ex. 1003, ¶ 182 (citing Ex. 1004, [0404]). First, Swafford was not a reference used in the combination for Ground 2, so a POSITA would not have understood its relevance to the Ground 2 combination. In my opinion, as detailed for element [1.4] in Ground 1, the cited section of Swafford says nothing about overlapping or substituted video and is only about using the shelf label in unison with the product, which are separate and discrete components.

211. Finally, Dr. Tentzeris makes the same incorrect assertion from Ground 1 based on Swafford (not a reference used in Ground 2) that “a POSITA would understand that designing substitutive video content in overlapping display areas is commonly used to ‘provide additional information to a customer or to attract customers’ attention.” Ex. 1003, ¶ 182 (citing Ex. 1004, [0404]). But based on my review, Swafford was not a reference used in the combination for Ground 2, so a

POSITA would not have understood its relevance to the Ground 2 combination. Even if Swafford was considered for Ground 2, as detailed for element [1.4] in Ground 1, the cited section of Swafford says nothing about overlapping or substituted video and is only about using the shelf label in unison with the product, which are separate and discrete components.

212. Further, Fig. 14 does not meet the requirement of a “virtual electronic shelf label” of element [1.4]. Unlike Fig. 5, Fig. 14 does not have any terminal mounted on the shelf. Instead, Fig. 14 shows the shelf tag terminal built into the video display terminal 80. I have reviewed Dr. Tentzeris’s deposition, where he attempts to justify his assertion that Fig. 14 discloses a shelf tag terminal mounted to the shelf, and I disagree. Tentzeris Dep., 178:3-180:9. Contrary to Dr. Tentzeris’s view, a POSITA would not consider a display that is part of video display terminal 80, placed on a shelf to be an electronic shelf label, virtual or otherwise. A POSITA would understand a shelf label to be mounted to the front of a shelf. This is consistent with the description in the specification of the ’669 Patent. Ex. 1001, 4:14-16 (screen covers the front of a shelf rail), 5:22-28 (video screens are attached to shelf rail), 6:55-56 (same). Under Dr. Tentzeris’s view, anything sitting on a shelf—including a product itself—could be considered a shelf label. A POSITA would not understand the term to be that broad.

2. Claims 7 (and therefore claims 8-10) and 11

- a. [7.1]: Masumoto does not disclose a system “wherein each device is designed to broad-cast adjustment data for adjusting the playback progress of the devices (6A, 6B) over its communication stage if it detects an asynchronous playback progress”**

213. Dr. Tentzeris relies entirely on Ground 1 for the argument that limitation [7.1] is met in Ground 2. Ex. 1003, ¶ 204. I understand that Masumoto does not disclose limitation [7.1] for Ground 2 for the same reasons Masumoto does not disclose limitation [7.1] for Ground 1.

- b. [11.1]: Kipp does not disclose a system “wherein the communication stage is de-signed to use UDP multicast data packets for the communication”**

214. Dr. Tentzeris’s entire argument for Ground 2 is that UDP is a well-known protocol, citing the same phrase from Kipp relied on by Dr. Tentzeris for Ground 1. Ex. 1003, ¶ 209. As detailed for Ground 1, by my review, Kipp lists a number of protocols that it purports can be used for video delivery. As also detailed for Ground 1, I find that Dr. Tentzeris conflates communication for downloading video content—which is all the cited section of Kipp addresses—and communication of progress data—which is what is required of the communication stage claimed in the ’669 Patent. In my view, these are two different types of communication. Importantly, the ’669 Patent discloses a system where video is already downloaded to the playback devices. Ex. 1001, 2:15-28. Therefore, in my opinion, the disclosure in Kipp of using UDP for downloading video content is irrelevant to showing

disclosure of using UDP for the communication stage of the challenged claims. I find that, beyond the disclosure of Kipp, Petitioner provides no reason why a POSITA would have found it obvious to use UDP for transmitting progress data.

215. Claim 11 requires “the communication” to be “according to claim 1” where it is used to “communicate data” comprising “video playback progress-data” to “determine whether [the video playback of one device] is in a synchronous or asynchronous playback progress with the other devices.” This communication is disclosed by the specification at 3:59-67, in reference to the design where “each device is designed to broadcast adjustment data for adjusting the playback progress of the devices over its communication stage if it detects an asynchronous playback progress.” Ex. 1001, 3:25-28. The ’669 Patent teaches that this adjustment data is the preferably a single frame number. “In this preferred embodiment, immediately after detection of the asynchronous playback progress the detecting device (the device that detected the asynchronous playback progress) defines the frame number at which playback shall continue and instructs all the other devices to switch to said defined frame number. A POSITA would understand from this that such a device detects an asynchronous playback progress and UDP multicasts a frame number to all of the other devices to synchronize their playback.

216. Kipp does not utilize UDP for such communication. Kipp utilizes UDP for delivering “segmented video content ... to a playback device.” Ex. 1006, [0129].

Kipp does not disclose the use of UDP for the communication of “video playback progress-data.” Instead, Kipp teaches that each “playback device determines (e.g., calculates) an estimated live-point (or current point for time-shifted content) time of the server based on the age of the playlist and sets a scheduled playback time for the video fragments based on the estimated live-point time.” Ex. 1006, [0007]. Then “the playback device modifies the video fragments until the actual playback times match the scheduled playback times” such that “[w]hen each playback device employs this technique, playback of the video content across multiple playback devices is synchronized.” *Id.* Thus, Kipp teaches playback synchronization through the live-point time maintained by each playback device, which a POSITA would have understood requires no communication between devices for synchronization.

217. Further, even were Kipp’s disclosure of using UDP for downloading video content considered a disclosure of using UDP to send progress data via the communication stage, Kipp does not disclose using UDP *multicast* data, as required by this limitation. As discussed for Ground 1, UDP is capable of unicasting and broadcasting data, in addition to multicasting data. *See* RFC 5405; Ex. 2001, 17. Based on my review, Dr. Tentzeris has provided no rationale for a motivation to use multicast data over any other form of UDP data. In his deposition, Dr. Tentzeris admitted that UDP is capable of unicasting data. Tentzeris Dep., 50:25-51:2. In fact, as would be understood by a POSITA, UDP for unicast transmission “is the most

common case.” RFC 5405. Using UDP for multicast is a “specialized application[.]”

Id. As mentioned above, Kipp utilizes UDP for delivering “segmented video content ... to A playback device.” Ex. 1006, [0129] (emphasis added). Kipp does not disclose the use of UDP for anything other than the transmission of video content from a server to a single playback device. A POSITA would have understood Kipp to disclose UDP’s unicast mode of transmission and to teach away from other options, such as UDP’s multicast mode of transmission.

218. Because Dr. Tentzeris has failed to show how element [11.1] is met, Dr. Tentzeris fails to meet its burden of showing that Claim 11 is unpatentable by a preponderance of the evidence under Ground 2.

C. A POSITA Would Not Have Been Motivated to Combine Masumoto, Kipp, and Takashi

219. In my opinion, even if the Masumoto/Kipp/Takashi combination disclosed all limitations of the challenged claims (and my opinion, it does not), Dr. Tentzeris has not shown that there would have been a motivation to combine these references. As with Ground 1, based on my review, Dr. Tentzeris is trying to combine Masumoto, which discloses a large multi-display system, with a reference focused on small shelf-based displays (Takashi). Beyond these two disparate references, Dr. Tentzeris adds on a third: Kipp, which discloses playing video on multiple monitors. *See, e.g.*, Ex. 1006, [0025]. Unlike Masumoto, I find that Kipp does not

disclose playing different parts of a video on different displays. And unlike Takashi, Kipp does not disclose anything related to shelf tags or product video.

220. Without any connection between these references, Dr. Tentzeris provides seven different rationales for combining Masumoto with Kipp and Takashi. Ex. 1003, ¶¶ 183-91. By my review, all are flawed.

221. First, Dr. Tentzeris asserts it would have been obvious to combine Masumoto with Kipp because “Masumoto and Kipp are designed to achieve the same goal to synchronize a video across multiple displays.” Ex. 1003, ¶ 184. In my opinion, that is incorrect. Masumoto contemplates “video wall systems and signage systems,” such as what one might see in a conference room. Ex. 1005, [0148]. Masumoto is directed toward a “multi-display apparatus for displaying a single image by combining a plurality of displays.” Ex. 1005, Abstract, [0148]. By contrast, Kipp is directed to “reproduction of video content” for synchronized playback at “multiple premises,” such as when people at different households want to watch a live sporting event on Amazon Prime. Ex. 1006, [0004], [0028]. “Such networks 100 use a series of interconnected communication links 101 (e.g., coaxial cables, optical fibers, wireless, etc.) to connect multiple premises 102 (e.g., businesses, homes, consumer dwellings, etc.) to a local office or head end 103.” *Id.*, [0028]. Masumoto displays different images on each display where all of the displays are in one location, while Kipp displays the same image on multiple displays, where the displays may be in

different locations. A POSITA would have understood that errors would be more disruptive in Masumoto's co-located displays than in Kipp's isolated displays. Kipp teaches a robust technique designed for slow and laggy Internet connections where "the playback device ... calculates an estimated live-point ... time" and synchronizes its playback to this time in isolation, without any communication. Masumoto instead teaches a crisper synchronization that relies on local, reliable network connections where synchronization of all displays can be managed by a single master.

222. Second, Dr. Tentzeris opines that it would have been obvious to combine Masumoto and Kipp due to a "well-recognized need in a business premise—a need for synchronously providing clients with promotional information or advertisement." Ex. 1003, ¶ 185. To support this supposedly "well-recognized need," Dr. Tentzeris cites the '669 Patent. *Id.* I have been informed that using the challenged patent as a roadmap for modifying the prior art is impermissible hindsight and should be rejected. Dr. Tentzeris also cites Kipp for the propositions that "playback devices deployed to a common location (e.g., a sports bar, a residence, etc.) may synchronize" and advertisements may "playback on multiple digital billboards," (Ex. 1006 [0023], [0124]), and Clontz for the proposition that "[t]he shelf may be implemented with 'connected' or 'unconnected-displays.' 'Connected' means that displays that run the same ads all the time" (Ex. 1009, [0032]). I find that none of these citations support the proposition that there was a "well-recognized need" for synchronizing

promotional information or advertisements on multiple video screens as Dr. Tentzeris alleges. Ex. 1003, ¶ 185.

223. Third, similar to Ground 1, Dr. Tentzeris opines there is a “structural similarity between Kipp’s displays and Masumoto’s displays,” such that a “POSITA would have recognized, from Kipp’s teaching, that it would improve Masumoto’s similar device (i.e., displays).” Ex. 1003, ¶ 186. In my opinion, this is also incorrect. In Kipp, “[t]he display devices 206 may be any type of device configured to receive a video signal and output visual images corresponding to that video signal.” Ex. 1006, [0041]. Dr. Tentzeris does not explain how a POSITA would look at a reference describing “any type of device” and recognize an improvement that could be applied to a specific type of device, and in particular, to reach an electronic shelf label. But even giving Dr. Tentzeris the benefit of the doubt, Dr. Tentzeris does not explain how Kipp improved a display device in such a way that it would have been obvious to improve a display device in Masumoto in the same way, or how that would result in the electronic shelf labels described in the ’669 Patent. Kipp’s discloses video playback devices that synchronize in isolation based on estimated calculations to avoid internet delays. A POSITA would have understood that using these isolated estimated calculations for synchronizing Masumoto’s playback displays would result in visible and distracting synchronization errors in a multiple-display videowall.

224. Fourth, Dr. Tentzeris opines a POSITA would have been “readily able to combine” the three references “with an expectation of success,” stating it would have been “routine.” Ex. 1003, ¶ 187. But in my opinion, Dr. Tentzeris fails to explain how combining Masumoto’s big-screen video synchronization techniques with Takashi’s electronic shelf tag system and Kipp’s multi-premise streaming system would have been routine or would come with an expectation of success. Dr. Tentzeris offers nothing beyond bare conclusions for this point. Ex. 1003, ¶¶ 187, 228. Dr. Tentzeris bases this conclusion on the one-line opinion that “[t]he displays in Masumoto, the multiple display devices in Kipp, and the image display terminal which may be a CRT or an LCD in Takashi all play the same role as displaying video content in the existing video playback art.” Ex. 1003, ¶ 187. This conclusion ignores the details of how video content gets to each of these playback devices, and how each of these playback devices coordinates its operation. Masumoto relies on a local master display to coordinate the other playback displays, Kipp relies on a remote video server to deliver video but then relies on each of the playback devices to manage its own synchronization in isolation, and Takashi relies on a complicated network with multiple servers, a database connected (wired or wirelessly) to multiple devices. If A POSITA were to find these three heterogeneous configurations truly “readily able to combine” and “routine” then Dr. Tentzeris could have proposed such

a combination, but did not. Without such a combination, Dr. Tentzeris cannot convincingly opine of an “expectation of success.”

225. Fifth, Dr. Tentzeris opines a “POSITA reading Masumoto and Kipp naturally would have looked to Takashi for additional details regarding how to display advertisement contents in a business premise such as a retail store” due to a “universal, obvious goal of all such systems to display promotion content related to the premise where the systems are located.” Ex. 1003, ¶ 188. But in my opinion, Dr. Tentzeris fails to offer factual support or evidence. Dr. Tentzeris’s argument is just that: argument. Based on my understanding of the legal standard, it is my opinion that instead the Petition points to conclusory expert opinion that does not relate to any particular combination of the prior art. I find that the explanation of the Petitioner’s expert is flawed because it is generic. Furthermore, Masumoto and Kipp disclose systems for playback of standard video content, such as television shows or broadcast sports, which already embed promotion content in the standard video content as commercial breaks and embedded banners.

226. Sixth, Dr. Tentzeris alleges a POSITA would have understood “that to *attract* customers,” “provide additional information to a customer or to attract a customer’s attention’. . . , designing other promotion content to substitute a part of an advertisement video is a commonly used promotional strategy in a business premise, e.g., a retail store.” Ex. 1003, ¶189. It is not clear to me what Dr. Tentzeris is

proposing here, or which pieces of prior art should be modified, or how. But it is my opinion that this proposed motivation to combine fails because it does not clearly articulate the proposal, which pieces of prior art should be modified or how. From this opinion, Dr. Tentzeris concludes with a flawed opinion that “it would be obvious to a POSITA, in view of Takashi, to use the multiple displays in the combination of Masumoto and Kipp to display the product information in the similar manner (e.g., displaying product information or product price related information by means of virtual electronic shelf labels displayed within a section of a scree[n]’s display area overlapping with a video content) as Takashi in the premise of a retail store.” Ex. 1003, ¶ 190. As I have stated above, Dr. Tentzeris has not provided an opinion on how “the combination of Masumoto and Kipp” would coordinate its playback devices. Furthermore, a POSITA, in view of Takashi, would not look to the remote video distribution system of Kipp, nor to Masumoto’s contained videowall system of similar playback devices, for the well-known operation of overlapping video content on top of other imagery or other video content. From this, Dr. Tentzeris concludes that “a POSITA would have found it obvious to incorporate Kipp’s synchronously displaying advertisement content associated with a premise where the multiple playback devices are co-located and Takashi’s manner of displaying promotion content of the product in Masumoto’s system.” Ex. 1003, ¶ 191. For the above reasons, I disagree. For the above reasons, a POSITA would not “have been motivated

to implement the video content displayed on Kipp’s multiple playback devices and the product content displayed on Takashi’s image display terminal, in Masumoto’s multiple displays when applying Masumoto’s multiple-display apparatus in a specific business premise.” Ex. 1003, ¶ 183.

227. Finally, Dr. Tentzeris alleges that it “is a universal, obvious goal of all such systems to attract customers’ attention” and that a “POSITA reading Masumoto and Kipp would have been motivate[d] to apply the shelf tag terminal 70 and the image display terminal 80/80A to the combination of Masumoto and Kipp.” *Id.*, ¶ 218. In my opinion, this reasoning amounts to the same flawed, generic rationale as discussed above.

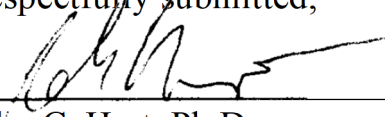
228. For these same reasons, a POSITA would not “have been motivated to combine the teachings of Masumoto with Kipp and Takashi,” nor would that POSITA “reading Masumoto in view of Kipp and Takashi ... have found it obvious to implement the video content displayed on Kipp’s multiple playback devices and the product content displayed on Takashi’s image display terminal, in Masumoto’s multiple displays when applying Masumoto’s multiple-display apparatus in a specific business premise, e.g., a retail store.” Ex. 1003, ¶ 224.

XI. CONCLUSION

229. For all the above reasons, I find that Petitioner has not met its burden of demonstrating the unpatentability of any challenged claim. Accordingly, I understand that Patent Owner requests the Board confirm the patentability of claims 1-15.

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

Dated: September 6, 2024

Respectfully submitted,
By: 
John C. Hart, Ph.D.

CERTIFICATE OF SERVICE

Pursuant to 37 C.F.R. § 42.6(e), I certify that on September 6, 2024, a copy of **DECLARATION OF JOHN HART, PH.D.** was served upon the below-listed counsel by electronic mail:

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Dated: September 6, 2024

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