UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SPORTRADAR AG,
Petitioner

v.

SPORTSCASTR INC.,
(D/B/A PANDA INTERACTIVE),
Patent Owner.

IPR2025-00269
U.S. Patent No. 10,805,687

PETITION FOR *INTER PARTES* REVIEW UNDER 37 C.F.R. §42.101

TABLE OF CONTENTS

I. INTRODUCTION 1

II. MANDATORY NOTICES UNDER 37 C.F.R. §42.8(A)(1) 4

A. Real Parties-in-Interest 4

B. Related Matters 4

C. Lead and Back-up Counsel and Service Information 5

D. Fee Payment 6

III. REQUIREMENTS FOR IPR UNDER 37 C.F.R. §42.104 6

A. Grounds for Standing 6

B. Identification of Challenge and Relief Requested 6

1. Claims for Which IPR Is Requested 6

2. Grounds for Challenge 7

3. Claim Construction 7

4. How the Claims Are Unpatentable 9

5. Evidence Supporting This Challenge 10

IV. TECHNOLOGY BACKGROUND: PROTOCOLS FOR REAL-TIME OR LOW-LATENCY DATA TRANSMISSION 10

A. HTTP Polling 11

B. WebSocket 11

V. THE '687 12

A. Alleged Problem 12

B. Alleged Invention 12

C. Prosecution History 15

VI. LEVEL OF ORDINARY SKILL IN THE ART 16

VII. OVERVIEW OF THE PRIMARY REFERENCES 16

A. Ellis 16

B. Herzog 18

VIII. EACH OF THE CHALLENGED CLAIMS IS UNPATENTABLE 20

A. Ground 1: Claims 19-25, 27-30 Are Obvious Over Ellis in View of Spivey 20

1. Motivation to Combine 20

2. Independent Claim 19 25

3. Dependent Claim 20 44

4. Dependent Claim 21 47

5. Dependent Claim 22 49

6. Independent Claim 23 50

7. Dependent Claim 24 51

8. Dependent Claim 25 52

9. Independent Claim 27 56

10. Dependent Claim 28 58

11. Dependent Claim 29 59

12. Dependent Claim 30 59

B. Ground 2: Claims 19-25, 27-30 Are Obvious Over Herzog in View of Ellis and Spivey 61

1. Motivation to Combine 61

2. Independent Claim 19 67

3. Dependent Claim 20 79

4. Dependent Claim 21 81
5. Dependent Claim 22 82
6. Independent Claim 23 83
7. Dependent Claim 24 84
8. Dependent Claim 25 85
9. Independent Claim 27 86
10. Dependent Claim 28 88
11. Dependent Claim 29 88
12. Dependent Claim 30 88

IX. SECONDARY CONSIDERATIONS OF NON-OBVIOUSNESS 89

X. THE BOARD SHOULD NOT EXERCISE DISCRETIONARY DENIAL 90

A. The ’687 Has Not Been Subject to a Prior Petition by the Current Petitioner 90

B. *Fintiv* 90

XI. CONCLUSION 90

*All emphases and coloring added, unless otherwise noted.

TABLE OF AUTHORITIES

Page(s)

Cases

Apple Inc. v. Uniloc 2017 LLC,
IPR2018-00580, Paper 13 at 10 (PTAB Aug. 21, 2018).....1

General Plastic Industrial Co. v. Canon Kubushiki Kaisha,
IPR2016-01357, Paper 19 (PTAB Sept. 6, 2017).....1

Geo. M. Martin v. Alliance Machine,
618 F.3d 1294 (Fed. Cir. 2010) 90

Phillips v. AWH Corp.,
415 F.3d 1303 (Fed. Cir. 2005) 7

SportsCastr Inc. v. Genius Sports Ltd.,
No. 2:23-cv-04771-JRG (E.D. Tex.) 4

Videndum Production Solutions, Inc. v. Rotolight Limited,
IPR2023-01218, Paper 12 (April 19, 2024) 90

Statutes

35 U.S.C. §102.....7, 15

35 U.S.C. §103.....7, 15

Other Authorities

37 C.F.R. §42.8(A)(1).....4

37 C.F.R. §42.10(b) 6

37 C.F.R. §42.63(d)(2)(i).....94

37 C.F.R. §42.100(b) 7

37 C.F.R. §42.104 6

MPEP §1302.14 16

I. INTRODUCTION

Sportradar AG ("Petitioner") requests *inter partes* review of claims 19-25 and 27-30 of U.S. Patent No. 10,805,687 (Exhibit 3, "'687"). This petition presents the same art and the same grounds, and relies on substantively the same declaratory evidence (albeit offered by a different expert), as co-pending IPR2024-01307, filed August 22, 2024 by Genius Sports Ltd. ("Genius"). Petitioner expects an institution decision by February 22, 2025. If instituted, Petitioner will file a motion under 37 C.F.R. §42.222(b) to join IPR2024-01307. If Genius' petition is withdrawn prior to the Board's institution decision, however, Petitioner intends to rely on the instant petition as grounds for seeking *inter partes* review of '697. Petitioner has spoken with counsel of record for Genius, and Genius does not oppose joinder to the '1307 petition in the event it is instituted. In that case, Petitioner will also agree to assume a "passive understudy role," and, as such, the *General Plastic* factors would be "effectively neutraliz[ed]." *See Apple Inc. v. Uniloc 2017 LLC*, IPR2018-00580, Paper 13 at 10 (PTAB Aug. 21, 2018). As a result, the instant "copycat" petition does not present any additional complexity or require any additional effort by the Patent Owner or the Board, and, therefore should be granted along with the '1307 Petition.

The '687 replays previously disclosed server components in a known way, to achieve a previously accomplished goal. Ex.1001 ¶¶63-71. The '687 does not claim

to have invented any new component. Rather, the '687 is directed to the known concept of providing two or more related types of content to user devices over the Internet using known real-time communication protocols. *Id.*

The '687 provides a video feed (a live stream of a sporting event) and at least one data feed (*e.g.*, the sporting event's score) to each device over separate "communication channels." *Id.* ¶63; Ex.1003, 19:16-23, 20:7-21, 22:62-23:9. The '687's final product is a scoreboard feature displayed on top of a video feed:

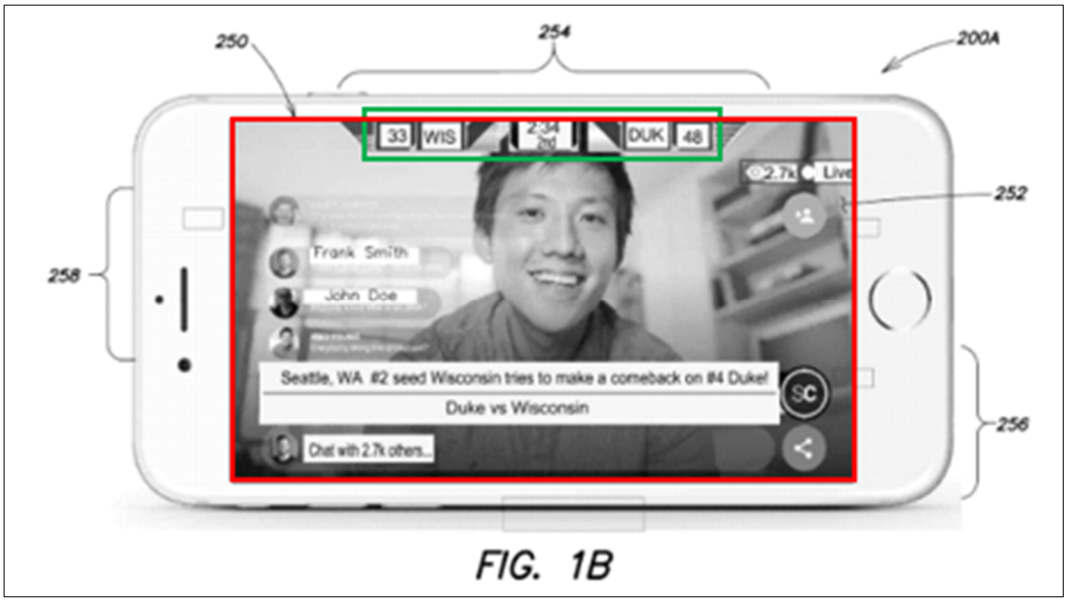


FIG. 1B

Ex.1003, Fig. 1B (annotated). But displaying content, such as the score or game clock, in conjunction with a live sporting event has existed since at least 1994:

Ex.1045.

Moreover, the ’687 even acknowledges that adapting this feature to live streaming and internet-based content distribution existed well before the ’687’s earliest possible priority date of August 5, 2016. Ex.1003, 1:13-3. For example, the ’687 admits that Twitch.tv, released in 2011, was a “live video streaming platform[]” that included “social networking components”—*e.g.*, additional content such as comments and other social-media interactions. *Id*. 2:4-27.

Although the ’687 framed the purported invention as an “inventive server and memory storage architecture,” the prior art discloses the ’687’s server and memory storage architecture. *Id.* 3:7-20. Ex.1001 ¶71. As shown below, Ellis, Herzog, and Spivey disclose every limitation of claims 19-25 and 27-30 (“Challenged Claims”)

and any differences in the arrangement of their disclosed architecture or data flow processes would have been obvious. Ex.1001 ¶71. Thus, for the reasons detailed in the asserted grounds below, Petitioner respectfully requests *inter partes* review ("IPR") of the Challenged Claims.

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

A. Real Parties-in-Interest

Sportradar AG, Sportradar Group AG, Sportradar Solutions LLC and Sportradar US LLC are the real parties-in-interest.

B. Related Matters

Patent Owner ("PO") has asserted the '687 against Petitioner in *SportsCastr Inc. v. Genius Sports Ltd.*, No. 2:23-cv-04771-JRG (E.D. Tex.), filed October 5, 2023 ("Texas Litigation"). *Sportradar Group, AG.*, No. 2:23-cv-04772-JRG (E.D. Tex.). PO has also asserted the '687 against Genius in *SportsCastr Inc. v. Genius Sports Ltd.*, No. 2:23-cv-04771-JRG (E.D. Tex.). Both cases ("Texas Litigation") were filed October 5, 2023. This case may affect, or be affected by, the Texas Litigation.

The '687 is one member of a patent family, other members of which are also asserted in the Texas Litigation, and each of which shares the same specification:

U.S. Patent Nos. 10,805,687; 10,425,697; and 11,039,218.[1] These patents are the subject of six IPR Petitions filed by Genius ("Genius IPRs"): the '697 is the subject of IPR2024-01308 (claims 1-9) and IPR2024-01309 (claims 19-25, 27-30); the '687 is the subject of IPR2024-01305 (claims 1-9) and IPR2024-01307 (claims 19-25, 27-30); and the '218 is the subject of IPR2024-2024-01310 (claims 1-15) and IPR2024-01311 (claims 16-30). In addition to the instant petition, Petitioner is filing five contemporaneous IPR petitions corresponding to the other five Genius IPRs, and, if instituted, will file §42.222(b) motions to join those IPRs.

Petitioner is also filing four other, contemporaneous IPR petitions challenging additional claims of the '697 and '687 not addressed by the Genius IPRs: two IPR Petitions collectively challenging claims 1, 10-18, 23, 24, and 26 of the '697; and two IPR Petitions collectively challenging claims 1, 10-18, 23, 24, and 26 of the '687.

C. Lead and Back-up Counsel and Service Information

Lead Counsel	Backup Counsel
Scott W. Cummings Reg. No. 41,567 scott.cummings@bclplaw.com	Alexander Walden provisionally recognized PTAB attorney under 37 C.F.R. §42.10 (*pro hac vice* affidavit to follow)

[1] Each patent in the family will be referenced by its last three digits. PO recently amended its complaint in the Texas Litigation to include claims 10-18 and 26 of the '697 and '687.

BRYAN CAVE LEIGHTON PAISNER LLP 1155 F St, N.W. Washington, D.C. 20004 Telephone: (202) 508-6000	alexander.walden@bclplaw.com Frank Fabiani Reg. No. 75,934 frank.fabiani@bclplaw.com BRYAN CAVE LEIGHTON PAISNER LLP 1290 Avenue of the Americas New York, NY 1104 Telephone: (212) 541-2000 Facsimile: (212) 541-4630

A Power of Attorney accompanies this Petition pursuant to 37 C.F.R. §42.10(b). Petitioner consents to electronic service by email at scott.cummings@bclplaw.com, alexander.walden@bclplaw.com, frank.fabiani@bclplaw.com, and SportradarIPR@bclplaw.com.

D. Fee Payment

Petitioner authorizes the U.S. Patent Office ("USPTO") to charge the filing fee and any other necessary fees to Deposit Account No. 02-4467.

III. REQUIREMENTS FOR IPR UNDER 37 C.F.R. §42.104

A. Grounds for Standing

Petitioner certifies the '687 is available for IPR and that Petitioner is not barred or estopped from requesting IPR on the grounds identified herein.

B. Identification of Challenge and Relief Requested

1. Claims for Which IPR Is Requested

Petitioner challenges claims 19-25 and 27-30 of the '687.

2. Grounds for Challenge

Petitioner challenges the claims based on the following references:

1. U.S. Patent Publication No. 2014/0229992 to Ellis et al. ("Ellis"), filed April 22, 2014, published August 14, 2014, is prior art under §102(a). Ellis is a continuation of an application filed on July 31, 2007.

2. U.S. Patent Publication No. 2016/0036910 to Spivey ("Spivey"), filed August 4, 2014, published February 4, 2016, is prior art under §102(a).

3. U.S. Patent Publication No. 2015/0163379 to Herzog ("Herzog"), filed December 11, 2013, published June 11, 2015, is prior art under §102(a).

Petitioner requests IPR on the following grounds:

Ground	Basis	Claims	References
1	§103	19-25, 27-30	Ellis in view of Spivey
2	§103	19-25, 27-30	Herzog in view of Ellis and Spivey

3. Claim Construction

Claims are construed according to the principles set forth in *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (*en banc*). 37 C.F.R. §42.100(b). The claim terms of the '687 should be given their plain and ordinary meaning as understood by a person of skill in the art ("POSA"). The claim constructions proposed for purposes of this proceeding are not a concession by Petitioner as to the proper scope of any

claim term in litigation nor a waiver of any argument in any litigation that claim terms in the '687 are indefinite or otherwise invalid or unpatentable. Petitioner reserves the right to respond to any of PO's constructions.

a. Means-Plus-Function Limitations

The '687 includes several means-plus-function claim limitations. In the Texas Litigation, PO contended that these means-plus-function claims are of the same scope as other non-means-plus-function claims. *See* Ex.1019. For example, PO cross-referenced Claim 27 in its entirety with Claim 19 in its infringement contentions. *Id.* 173. Moreover, Claim 28 contains overlapping disclosures with Claims 19C-C.1 and 21A, and Claim 29 contains overlapping disclosures with Claim 25. *See id.* 98-103, 130-137, 162-172, 174-184. For the purposes of this proceeding only, Petitioner adopts the structure purportedly advanced by PO in the Texas Litigation to the best of its ability, set forth below. *See* Ex.1019; 1020.

Limitation	Structure	Function
27.1	Media sources performing the algorithm disclosed in 9:25-50 and Figure 2 of the '687.	Providing the first copy to the first viewer client device via a first video communication channel;
27.2	Control Server performing the algorithm disclosed in 9:50-	Retrieving, via the Internet, first event information germane to a first live sporting event; and

	55 and Figure 2 of the ’687.	
27.3	Socket Server performing the algorithm disclosed in 9:55-67 and Figure 2 of the ’687.	Transmitting the first event information to at least the first viewer client device via a first event information communication channel that is different from the first video communication channel.
28.1	Socket Server performing the algorithm disclosed in 20:27-35 and Figure 2 of the ’687.	Transmitting and receiving first chat information regarding the first live sporting event via at least one first chat/system event Internet communication channel that is different from the first video communication channel and the first event information communication channel.
29.0	Control Server performing the algorithm disclosed in 17:48-55 and Figure 2 of the ’687.	Updating the first event information and queueing an asynchronous message including the updated first event information for transmission on the first event information communication channel.
30.0	HLS mother server, HLS child servers, and an HLS CDN performing the algorithm disclosed in 33:33-45 and Figures 8-9D.	Providing the first copy to the first viewer client device via a first video communication channel between the HLS CDN and the first viewer client device, wherein the first copy is based on the first HLS file suite received by the HLS mother server.

4. How the Claims Are Unpatentable

Section VIII, *infra*, explains how the Challenged Claims are unpatentable.

5. Evidence Supporting This Challenge

A list of exhibits is provided at the end of the Petition. The relevance of this evidence and the specific portions supporting the challenge are provided, *e.g.*, in Section VIII, *infra*. Petitioner submits a declaration of Dr. Omid Kia Ph.D., Ex.1001, in support of this Petition. The testimony and opinions in Dr. Kia's declaration are substantively the same as those in the declaration of Dr. Wicker submitted in support of IPR2024-01307 filed by Genius (attached hereto as Ex.1048). *See generally* Ex.1049 (comparison of Ex.1 and Ex.1048), ¶¶21-769. Petitioner relies on the entirety of Ex.1001 in support of this Petition and in response to any arguments raised by PO.

IV. TECHNOLOGY BACKGROUND: PROTOCOLS FOR REAL-TIME OR LOW-LATENCY DATA TRANSMISSION

Transmission control protocol (TCP) and internet protocol (IP), together known as "TCP/IP," aim to ensure reliable, low-latency, end-to-end data transmission between network-connected devices by dividing transmissions into "packets" and specifying rules for transmitting, routing, and receiving packetized messages. Latency, as it relates to live streaming, is the time delay between when an event occurs and when the distributed content related to that event, *e.g.*, video, audio, or other data, is displayed on a user device. Before the '687, developers and standards development organizations had built on top of TCP/IP or created

additional protocols to facilitate real-time transport of video and other data over the Internet. Ex.1001 ¶¶41-57.

A. HTTP Polling

HTTP is a protocol that is built on top of TCP/IP. And HTTPS is a secure version of HTTP that uses encryption and verification to protect data. HTTP polling consists of a sequence of request-response messages between a client and a server. Upon receiving a request, the server responds with a new message, if there is one, or with an empty response if no new message is available for that client. After a short time Δ, called the polling interval, the client polls the server again to see if any new messages are available. Various real-time applications including chat, online games, and text messaging used HTTP polling in the 2016-time frame. Ex.1001 ¶¶41-51.

B. WebSocket

WebSocket was a known alternative to HTTP polling in the 2016-time frame. It is a client-server communication protocol that is bi-directional, full-duplex, and continuous. Real-time web applications commonly feature WebSocket connections to facilitate a persistent stream of data from a backend server to the end client. Once a WebSocket connection is established between a server and a client, the client receives instant updates from the server without the need to poll. Ex.1001 ¶¶52-53, 58-59.

V. THE '687

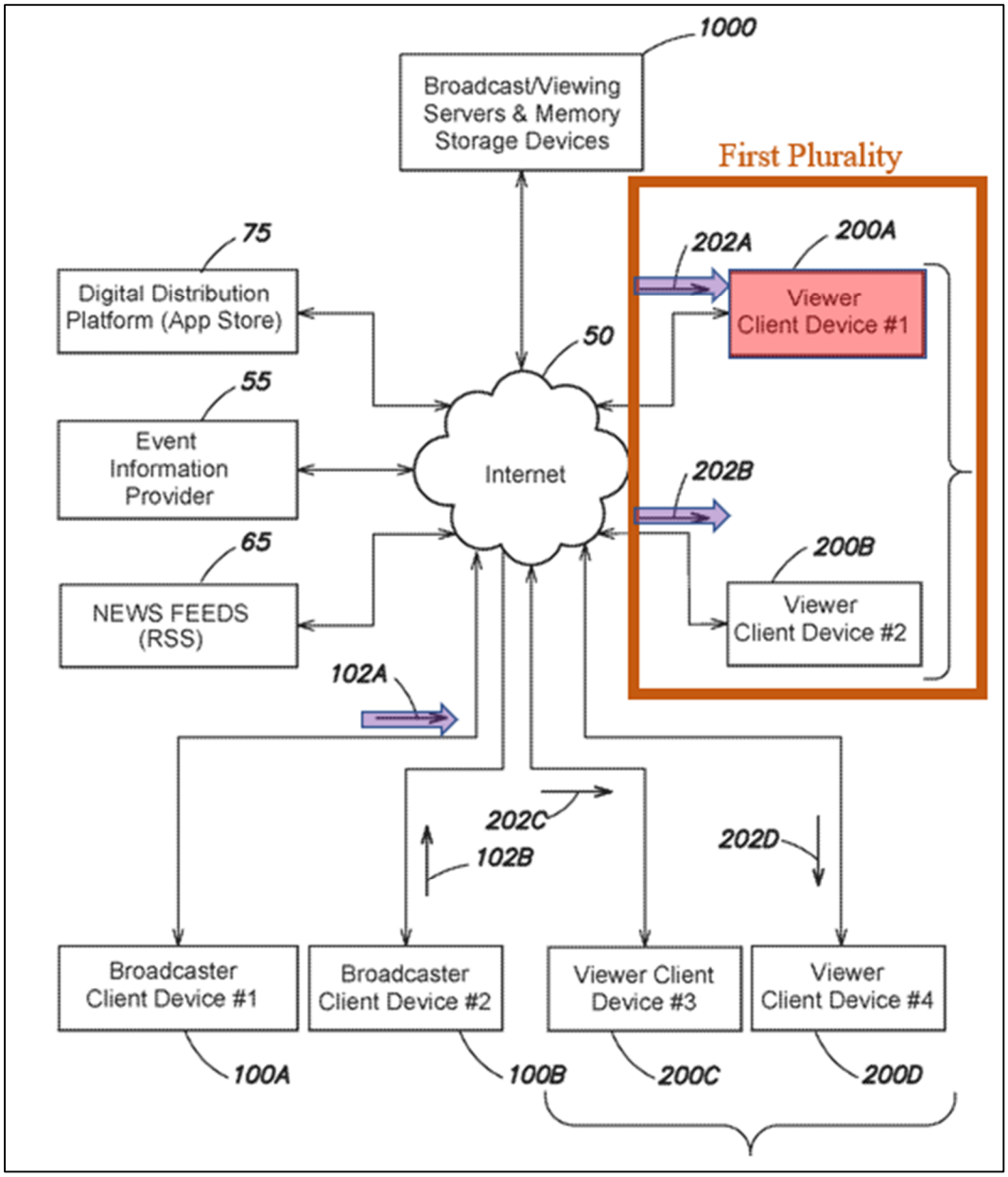
The '687 issued from Application No. 16/580,552 ("'552 Application"), which was filed September 24, 2019. Ex.1003. The '552 Application claimed priority to multiple provisional applications, the earliest of which, Provisional Application No. 62/371,558, was filed August 5, 2016. Ex.1003, 1:13-32.

A. Alleged Problem

According to the '687, prior art techniques for streaming video to multiple users suffered from a latency problem in which there would be a delay between the generation of a video and the time in which a user would receive the video stream. Ex.1003, 2:22-56, 5:16-37; Ex.1001 ¶62.

B. Alleged Invention

The '687 purports to solve this latency issue. Ex.1003, 5:28-37. The '687 is directed to a "server and memory storage architecture" for obtaining, and providing to viewers, (1) an "audio and/or visual feed" including "commentary associated with [a] live event" and (2) a "separate event data feed including real time information associated with the … live event." *Id.* 3:7-20; *see also id.* 7:16-37. A block diagram of the system is shown in Figure 1A:



Id. 11:19-25, Fig. 1A (annotated). Figure 1A depicts providing "a first viewer client device (200A)" of "a first plurality of viewer client devices (200A, 200B)" individual "copies (202A, 202B) of a first broadcaster's live stream of digital content (102A)." *Id.* 9:25-50.

Figure 2 shows additional system details. For instance, Figure 2 depicts viewer client devices ("VCDs"), media sources, a control server, a socket server, sockets, an event information provider, and a memory system.

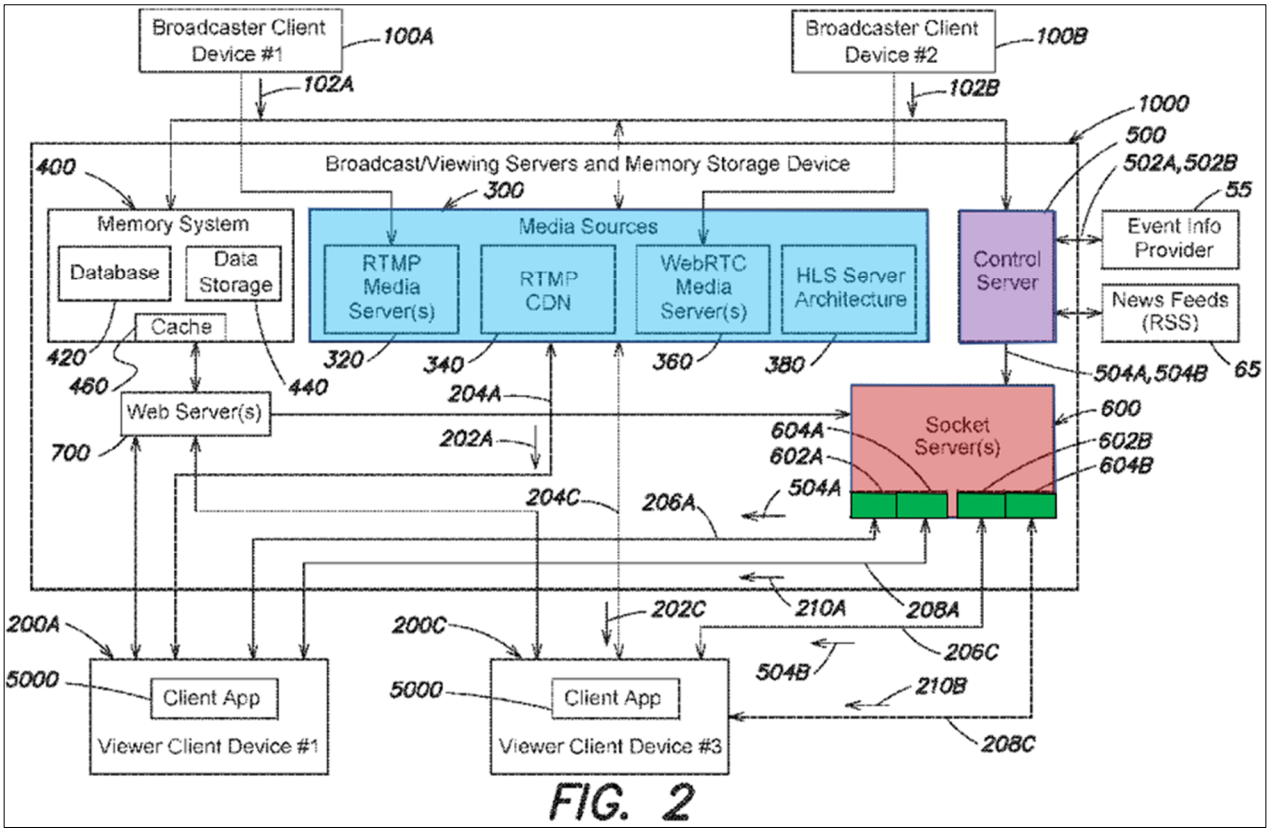


FIG. 2

Id. 11:26-28, Fig. 2 (annotated).

The '687 describes media sources as generic "computer servers." *Id.* 19:17-47, 55:15-25. Although in some implementations the media sources may include media servers directed to specific known protocols, such as RTMP, WebRTC, and HLS, the media sources' purpose is to "receive a live stream of video-based commentary from a given broadcaster client device and provide copies of the live stream of video-based commentary to one or more [VCDs]." *Id.*

The ’687 describes a control server as a generic server that retrieves “event information” from an “event information provider” to pass to the socket server, discussed below. *Id.* 19:48-55, 21:47-62. The event information is “germane to” a particular “live sporting event.” *Id.* 21:46-58.

The ’687 describes socket server(s) as generic servers. *Id.* 55:15-25. The socket server’s purpose is to “facilitate communication” of “synchronized event information retrieved by the control server” between the control server and the VCDs. *Id.* 20:7-21. The socket server uses “one or more sockets … dedicated to the particular event” allowing VCDs “to establish an event information channel with the socket server.” *Id.* The socket server then shares event information in “event messages” via the event information channel “in a synchronized manner” to all viewers “following the particular event.” *Id.* The socket server may facilitate communication of “chat messages” in a similar manner. *Id.* 20:22-54.

Although the ’687 claims that the foregoing server architecture and its functionality are “inventive,” as explained in more detail herein, the prior art discloses or renders obvious every limitation of at least one of the Challenged Claims. *See* §VIII, *infra*.

C. Prosecution History

The Examiner issued a notice of allowance on June 17, 2020, without issuing a single rejection under 35 U.S.C. §§102 or 103. *See* Ex.1005, 296-315. Although

the Examiner provided a statement of reasons for allowance, the rationale is conclusory. *See* MPEP §1302.14. The Examiner did not identify the closest prior art, quoted claim 1 in its entirety, and noted that the prior art fails to teach the quoted subject matter.

VI. LEVEL OF ORDINARY SKILL IN THE ART

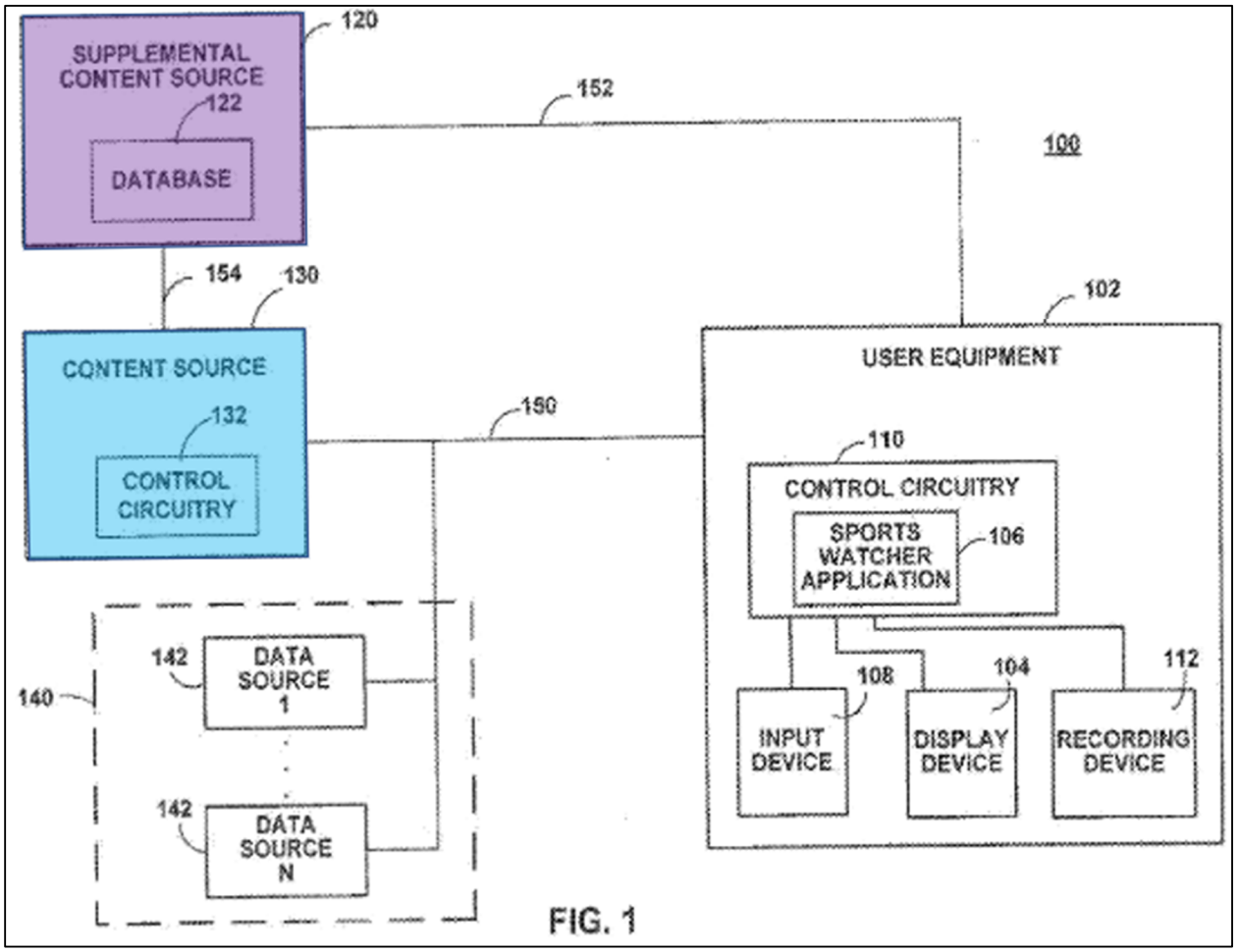
A POSA in the field of computer networking at the time of the alleged invention, August 5, 2016, would have had at least a bachelor's degree, or equivalent, in electrical engineering, computer engineering, computer science, or a related field or an equivalent number of years of working experience, and one to two years of experience in networking environments, including at least some experience with live-streaming network architecture. Ex.1001 ¶¶72-76. Additional education or experience in related fields could compensate for deficits in the above qualifications. *Id.*

VII. OVERVIEW OF THE PRIMARY REFERENCES

A. Ellis

Ellis identified the need for current delivery systems to provide "a custom set of features and functionality for specific types of media content, such as sporting events …." Ex.1016 ¶4. Ellis explained that the current systems "fail to take full advantage of today's high-end user equipment devices." *Id.* ¶5. To solve the above problems, Ellis discloses broadcasting systems and methods for "enhanced sports-related media content access and display." *Id.*, Abstract.

Figure 1 is an illustrative media system:



Id. ¶15, Fig.1 (annotated). As depicted, Ellis's system contains a content source, a supplemental content source ("SCS"), data sources, user equipment, and a sports watcher application. *Id.*, Fig. 1.

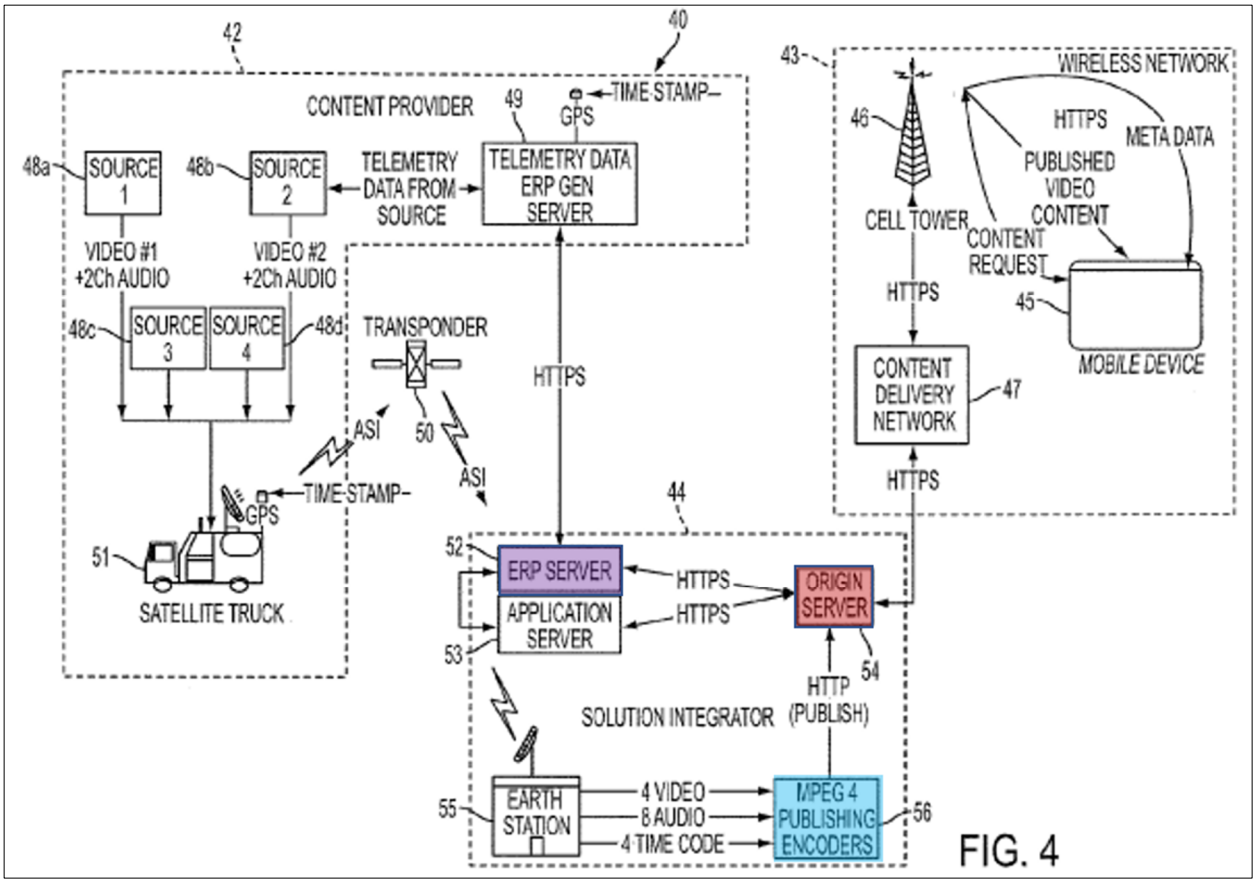
While the system provides the video feed over communication path 150, the SCS further provides real-time information over a separate communication path 152. *Id.* ¶¶41-42, Fig. 1. Importantly, "in some embodiments, this sports-related information is provided to user equipment 102 as a plurality of real-time data feeds"

where each "data feed may be individually accessed or subscribed to …." *Id.* ¶41. The SCS communication path 152 is protocol agnostic.

B. Herzog

According to Herzog, "may be desirable to provide a mobile device, such as a tablet" with a "video that is streamed live from the Internet to a client player using" HLS while also providing "additional information related to the HLS video," such as meta-data. Ex.1015 ¶3.

Herzog uses an "Indianapolis Car Race" to explain how its system transmits live "video, audio, and metadata … from a sports venue via different communication paths," to a client device. *Id.* ¶16. Figure 4, shown below, depicts an illustrative streaming network:



Id. ¶9, Fig. 4 (annotated). Herzog's Figure 4 shows MPEG 4 Publishing Encoders, an ERP server, and an origin server. *Id.* ¶¶43, 45. Content provider 42 provides "four video/audio streams" from "four different imaging sources" to MPEG 4 Publishing encoders who then stream the "video and audio data are streamed to the origin server 54 in an HTTP communications format." *Id.* ¶¶46, 49.

At the same time, the ERP server "receives the meta-data from ERP generator server 49 in HTTPS communication format." *Id.* ¶50. The meta-data "provides additional information related to the HLS video" and in the context of a car race, such as the example shown in Figure 4, "may include varying parameters regarding the status of each car and driver in the race" including "lap number, car speed, …

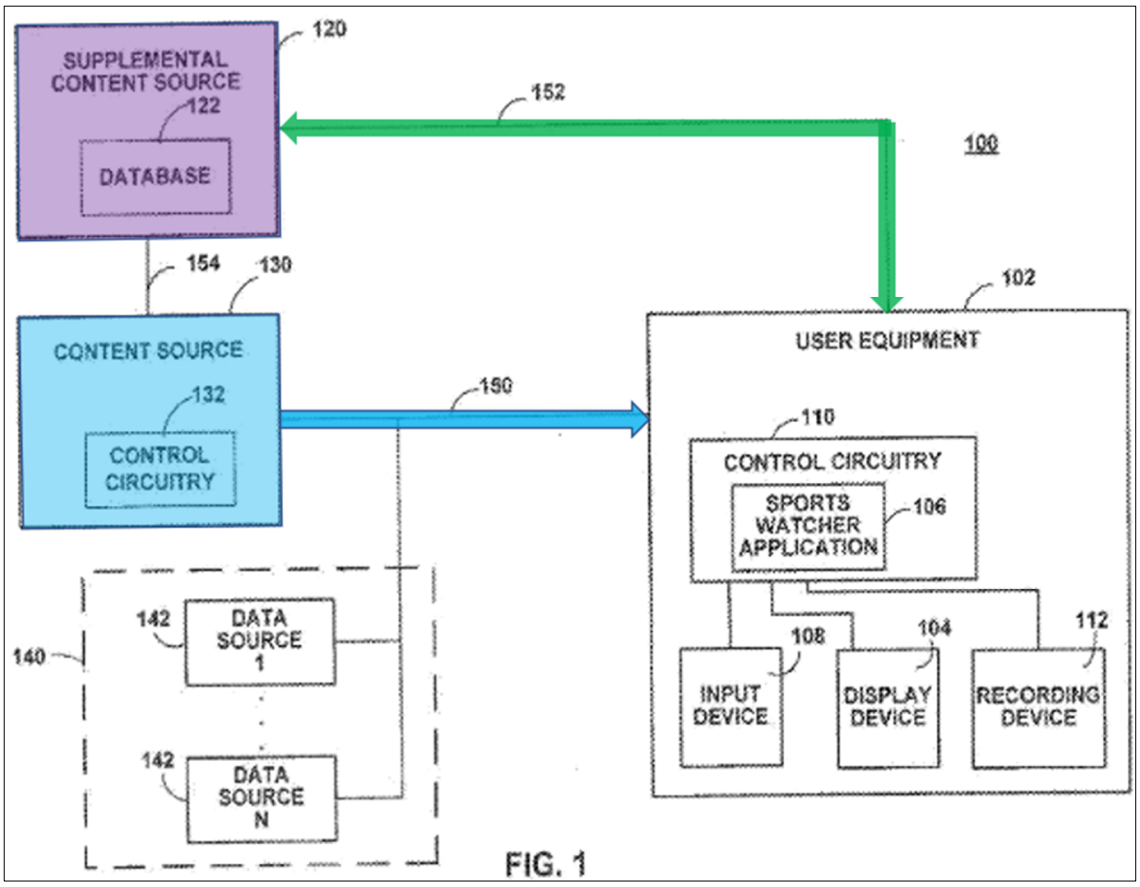
etc." *Id*. ¶¶3, 45. The user then receives a list of available meta-data and can "select specific meta-data associated with the audio and video data." *Id.* ¶34. As shown above in wireless network 43, the meta-data is then provided through the origin server to the user device "through one or more networks" using HTTPS. *Id.* ¶¶3, 27, 51. At the user device, "all the data may be displayed … in correct time sync" because the "video and audio data and the meta-data are both time stamped with consistent (e.g., GPS) timing protocols." *Id.* ¶18.

VIII. EACH OF THE CHALLENGED CLAIMS IS UNPATENTABLE

A. Ground 1: Claims 19-25, 27-30 Are Obvious Over Ellis in View of Spivey

1. Motivation to Combine

Ellis discloses the '687's broad functionality—providing (1) video and (2) data to a user over separate connections:

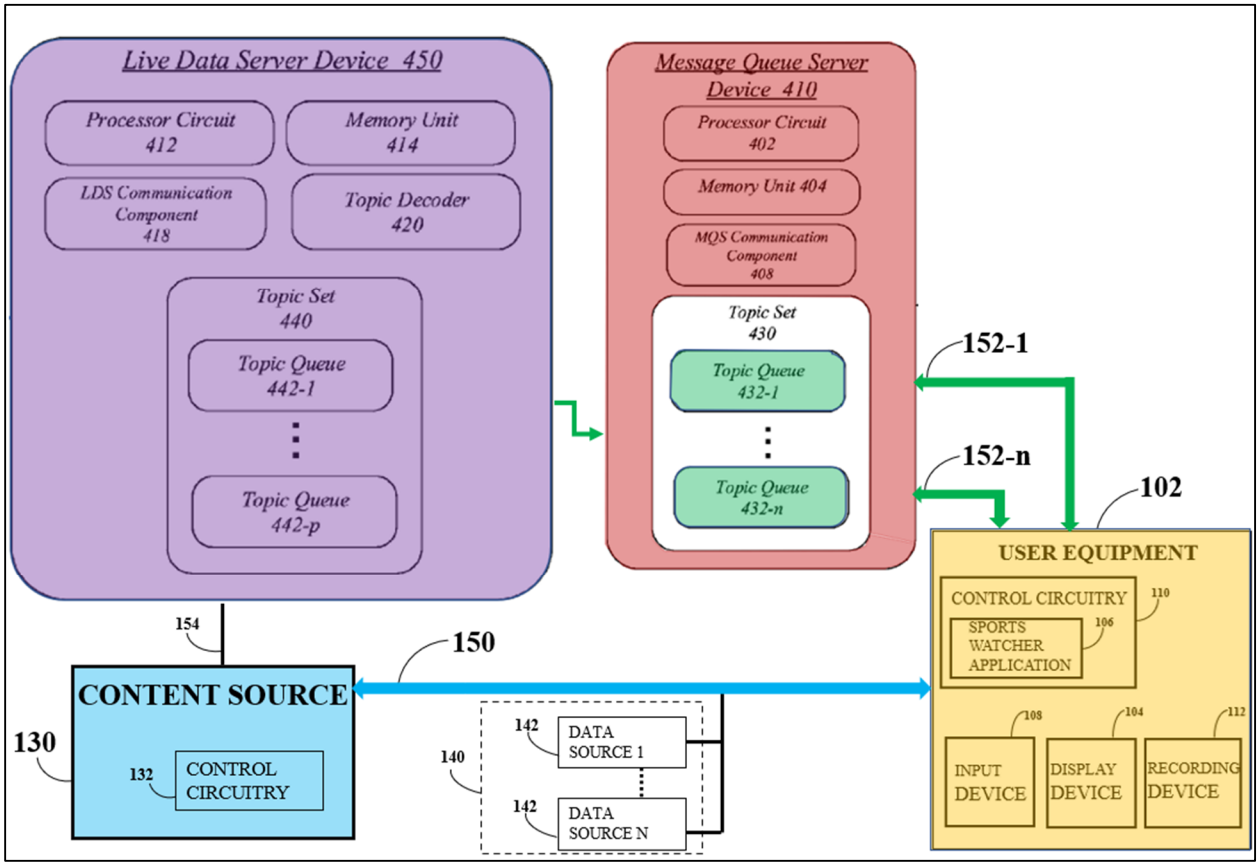


Ex.1016, Fig. 1 (annotated); Ex.1001 ¶106. Spivey provides details relating to backend server architecture supporting the described functionality and would have used a websocket connection in lieu of HTTP to transmit Ellis's SCS information. Ex.1001 ¶¶106-15.

Spivey explains that some live-event data delivery systems, such as Ellis's, suffer from latency issues. Ex.1001 ¶¶107-08. Spivey teaches a Live Data Server Device ("LDSD") and Message Queue Server Device ("MQSD") that could provide live-event data to any number of customers in milliseconds. *Id.* ¶109; Ex.1017 ¶¶27-28. A POSA, looking to improve Ellis's latency issues, would have implemented a

system such as Spivey, and would have recognized that combining Spivey's teachings with Ellis would improve Ellis's latency issue. Ex.1001 ¶¶107-11.

A POSA would have implemented Spivey into Ellis's current data delivery system by replacing Ellis's SCS with Spivey's LDSD and adding the MQSD to achieve a predictable result of decreased latency data delivery using a websocket connection in lieu of HTTPS. *See* Ex.1016 ¶¶39, 41, Fig. 1; Ex.1017, Fig. 4; Ex.1001 ¶¶109-11. An example of this combination is illustrated here in an annotated, combined flow chart of Ellis Figure 1 and Spivey Figure 4:



See Ex.1016, Fig. 1 (recreated); Ex.1017, Fig. 4 (recreated) (combined as explained above); Ex.1001 ¶111. The combined system would maintain the video content delivery system and upgrade the data delivery system to reduce latency. Ex.1001 ¶111.

A POSA would have been motivated to combine Ellis and Spivey. First, both relate to the same subject matter—content delivery for real-time events. *See* Ex.1016, Abstract; Ex.1017. Both describe methods and/or systems for streaming video and/or event data to one or more users. *See, e.g.*, Ex.1016 ¶156; Ex.1017, Abstract; Ex.1001 ¶¶112-14. Second, the references solve the same or similar problems, namely, providing video and/or event data to multiple users over the Internet quickly and to multiple users. *See, e.g.*, Ex.1016 ¶¶39-40, 176 Ex.1017 ¶27; Ex.1001 ¶¶112-14.

A POSA would have successfully combined Ellis and Spivey. Ellis and Spivey disclose complementary means of achieving the common goal of synchronizing multiple forms of data—including video/audio and event data—and transmitting that data to one or more users. For example, Ellis discloses systems for transmitting live video and related event data to viewers over the Internet. *See, e.g.*, Ex.1016 ¶¶40-41, 45, 74; Ex.1001 ¶¶114-15. Ellis also indicates that multiple users may view one or more different live events and receive related event information

and discloses various systems for transmitting such information. *See, e.g.*, Ex.1016 ¶¶39-41, 45, 74.

A POSA would have been motivated to combine Ellis with Spivey because Spivey provides a complementary solution describing the details of the backend architecture for transmitting event data to multiple users. Ex.1017, Abstract; Ex.1001 ¶115. For example, to implement Ellis's system and reduce its latency, a POSA would have had a reasonable expectation of success in using Spivey's system of "topic queues and open duplex communication connections" employing websockets and a "message queue server device" to broadcast "data from a live event (e.g., news event, a gaming event, sporting event, etc.)" to multiple users "in real-time." Ex.1017 ¶¶27, 58; Ex.1001 ¶115.

Combining certain portions of Ellis and Spivey would have been obvious because doing so would require only the simple substitution of known elements for another to obtain predictable results. Ex.1001 ¶114. For example, Ellis discloses compatible hardware and software components to act as a source for event information to be transmitted to users. *See, e.g.*, Ex.1016 ¶47 ("Content source 130, supplemental content source 120, and data sources 140 are shown in Fig. 1 as separate elements" but "[i]n practice, their functionality may be combined into a single mechanism and provided from a single system at a single facility, or their functionality may be provided by multiple systems at multiple facilities.").

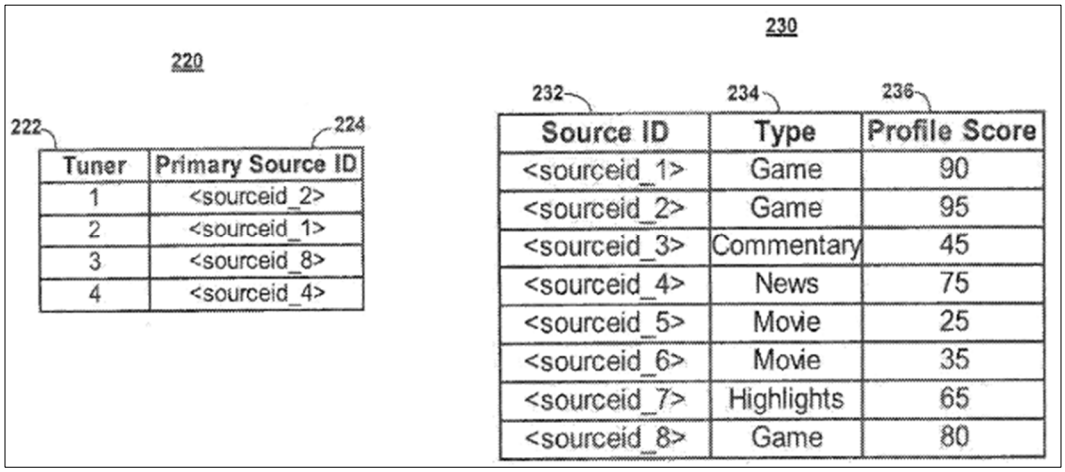
Predictably, therefore, a POSA would have simply substituted Ellis's SCS with Spivey's LDSD and MQSD. Ex.1001 ¶114. For example, it would have been obvious to substitute any of Ellis's elements with any combination of Spivey's LDSD, MQSD, and/or Live Data Source(s), which are similarly involved in transmitting live event data to users and may be configured in any manner. *See* Ex.1017 ¶34; Ex.1001 ¶114.

2. Independent Claim 19

a. Limitation 19.0[2]

To the extent the preamble is limiting, Ellis discloses this limitation. Ex.1001 ¶370; *see* Ex.1016, Abstract. Ellis discloses a system for providing digital content relating to different live sporting events by providing "enhanced information access and viewing functionality for sports-related programming," which includes "a sporting event, sports news, or sports commentary." Ex.1016 ¶¶8, 11. Figure 2B, below, shows sporting events available at the same time to any number of users.

[2] Ex.1004 is a claim listing that enumerates each claim element.



220

222 Tuner	224 Primary Source ID
1	<sourceid_2>
2	<sourceid_1>
3	<sourceid_8>
4	<sourceid_4>

230

232 Source ID	234 Type	236 Profile Score
<sourceid_1>	Game	90
<sourceid_2>	Game	95
<sourceid_3>	Commentary	45
<sourceid_4>	News	75
<sourceid_5>	Movie	25
<sourceid_6>	Movie	35
<sourceid_7>	Highlights	65
<sourceid_8>	Game	80

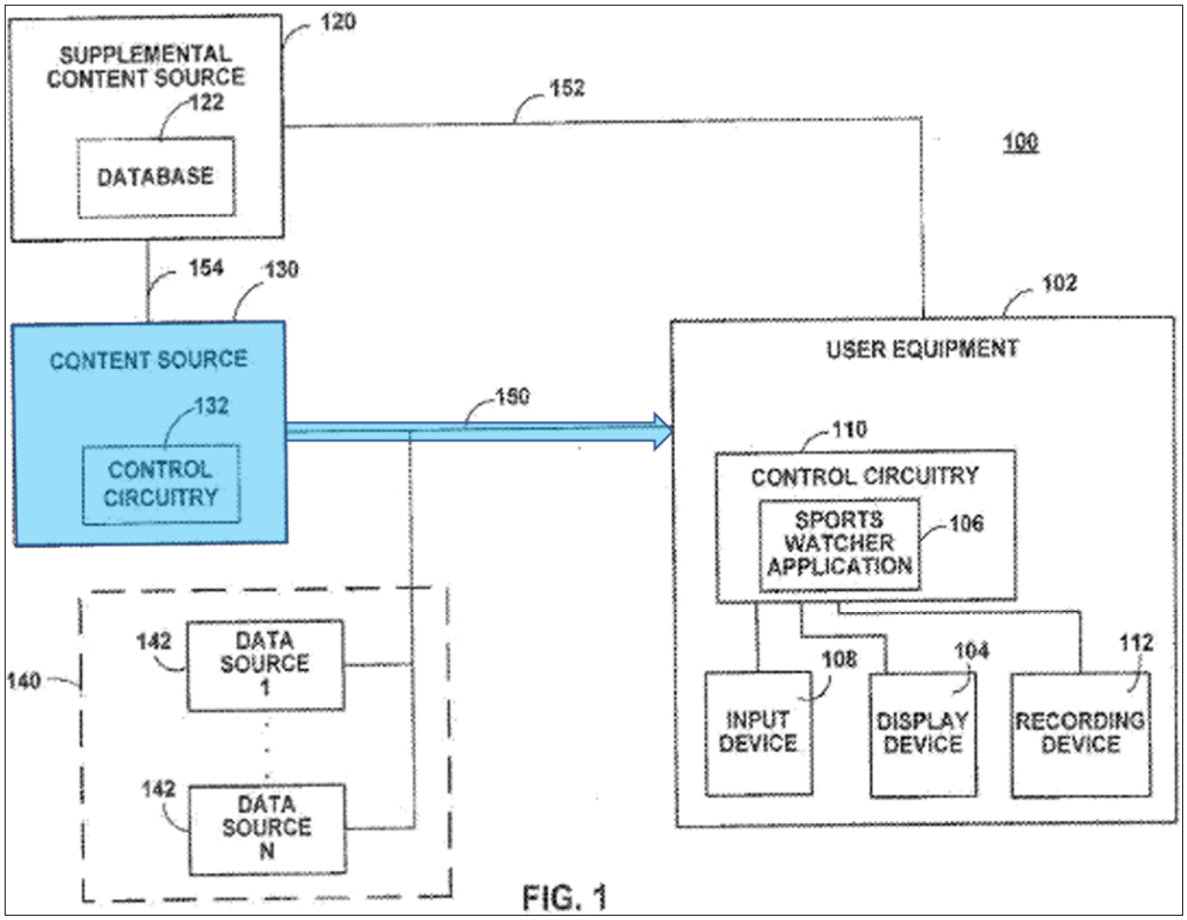
Id. ¶¶62-63, Fig. 2B (showing multiple live broadcasts available). The available games include multiple different live sporting events: Ellis discloses a system that provides the "media content" from those sporting events "to user equipment 102." *Id.* ¶40. Media content includes broadcast programming "and any other content capable of being displayed by, presented to, … or interacted with, using user equipment 102." *Id.* Broadcasts of live events would obviously, if not inherently, include video-based commentary. Ex.1001 ¶333.

Ellis discloses multiple broadcasters providing copies of each broadcaster's live stream of digital content including live sporting event video-based commentary to a plurality of user devices by providing a broadcast system where any "number of users" may receive signals from a content source. Ex.1016 ¶39. The signals are individual copies of the same live stream of digital content. *Id.* ¶¶40, 62, Fig. 2B; Ex.1001 ¶334. For example, Ellis's system broadcasts digital streams from the content source, which can be an "[i]nternet or network media/webserver." Ex.1016

¶40. Users can select which content to receive, as shown in Figure 2. *Id.* ¶62. Ellis then sends an individual copy of the live event to the users over a communication path. *Id.* ¶45. The communication path can be any "suitable wired or wireless path." *Id.* "For IPTV," content may be "delivered on a particular network address (e.g., multicast address) on which an IP socket is currently joined." *Id.* ¶74. A POSA would have understood this distribution system provides for a plurality of broadcaster devices, a plurality of copies of multiple broadcaster's live stream of digital content to a plurality of viewers. Ex.1001 ¶334.

b. Limitation 19.1

Ellis discloses content sources, which are "any suitable source of media content" such as a "[I]nternet or network media/web server, or any other suitable facility or system for originating or distributing passive or interactive content to user equipment." Ex.1016 ¶40. Ellis's content sources serve to receive the first/second broadcaster's live stream of digital content and distribute video content to users via communications paths. *See id.* ¶¶39-41, 45, 47; *see also* Ex.1001 ¶336. Figure 1 shows a content source distributing video content to users over communication path 150:



Ex.1016 ¶¶39-41, Fig. 1 (annotated). Ellis also discloses multiple content sources, *i.e.*, a plurality. *Id.* ¶39. ("[T]here may be numerous instances of content source 130 ….") Moreover, as explained below, Ellis's content sources perform the same functions as the media sources as recited in limitations 19.2-19.4; Ex.1001, ¶371.

c. Limitation 19.2

Ellis discloses that the content source "may be any suitable source of media content, such as, for example a cable system headend, satellite television distribution facility, television broadcast facility … Internet or network media/web server, or any other suitable facility or system for … distributing … content to user equipment

102." *Id*. ¶40. The content sources provide multiple streams of digital content, including "broadcast programming" and live sporting events. *Id.* ¶¶40, 45, 74. Ellis further discloses that a user may "actively watch one or more sporting events," and the user "may change or swap primary and/or secondary sporting events at any time." *Id.* ¶¶61-62. Thus, Ellis discloses content sources that receive multiple broadcaster's live streams of digital content and distribute that content to user equipment. Ex.1001 ¶372.

d. Limitations 19.3 and 19.4

i. First VCD of the first/second plurality of VCDs

Ellis discloses a first VCD of a first/second plurality of VCDs because Ellis discloses an "interactive media system" where "any suitable number of users" may "select any game from the listing" of "available games" to "watch the selected game." Ex.1016 ¶¶39, 94. For example, a first user in a first group of users (the first plurality) can choose to watch the Yankees broadcast from the YES network. *Id.* ¶55; Ex.1001 ¶340. Meanwhile, a first user of a second group of users can choose to watch a separate live stream of digital content, such as a different game or game commentary. Ex.1016 ¶¶61-62, 132, Fig. 2B; Ex.1001 ¶340. Thus, Ellis discloses multiple first users of multiple different pluralities of VCDs. Ex.1001 ¶373.

ii. First copy of first/second plurality of copies

Ellis discloses a first copy of a first/second plurality of copies because Ellis discloses an "interactive media system" where "any suitable number of users" may

"select any game from the listing" of "available games." Ex.1016 ¶¶39, 94. In other words, Ellis discloses a system that provides live streams of digital content from multiple live games as individual copies. *Id.* ¶¶39, 61-62, Fig. 2B; Ex.1001 ¶342. Ellis's content source, an internet server, provides the live stream over a connection path, which can be any "suitable wired or wireless path" including an internet connection. Ex.1016 ¶¶39, 45; Ex.1001 ¶342. Thus, each user would receive an individual copy of the live stream of digital content. Ex.1001 ¶373.

iii. Providing copies via a first/second Internet communication channel

Ellis discloses providing individual copies of multiple different live streams to multiple groups of client devices. §§VIII.A.2.d.i, VIII.A.2.d.ii, *supra*; *see* Ex.1001 ¶373. Ellis further discloses providing video content over an Internet communication channel. As an example of an "Internet communication channel," the '687 describes a "video" channel between a media server and a client device to convey video-based commentary. Ex.1003, 5:45-58. Ellis discloses providing video from a content source to user equipment, over a communication path. Ex.1016 ¶39. The content source can be an "internet or network media/web server" and the user equipment "may include computer equipment." *Id.* ¶¶40, 48. The communication path can be "for example, a satellite path, a fiber-optic path, a cable path, or any other suitable wired or wireless path." *Id.* ¶45. Ellis describes the communication path as a unique internet connection between the content source and the user equipment that provides

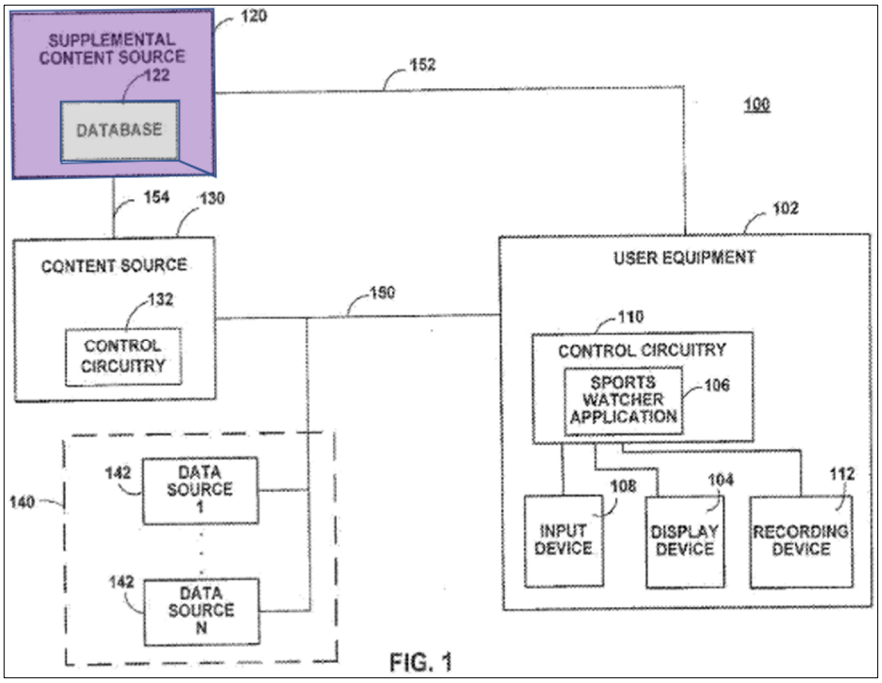
a video live stream: "[f]or IPTV, tuned content may include content to be delivered on a particular network address (e.g., multicast address) on which an IP socket is currently joined." *Id.* ¶74. Thus, Ellis discloses that each user receives a copy from the content source over an internet communication path that is unique to each user device. *Id.*; Ex.1001 ¶343.

e. Limitation 19.5

Ellis and Spivey both disclose this limitation. Ex.1001 ¶¶344-46. The '687 explains that the control server is a generic server comprising one or more processors, memory devices, and communication interfaces. Ex.1003, 55:15-25. The control server retrieves "event information" from an "event information provider." *Id.*, 21:46-65. The control server then transmits the event information to the socket server. *Id.*, 19:51-55, 21:47-58. The event information is "germane to" a particular "live sporting event," *e.g.*, score information of one of the live streams of digital content. *Id.*, 19:37-58, 21:5-46. Further, the control server may "store at least some portion of retrieved event information." *Id.*, 44:43-45:4.

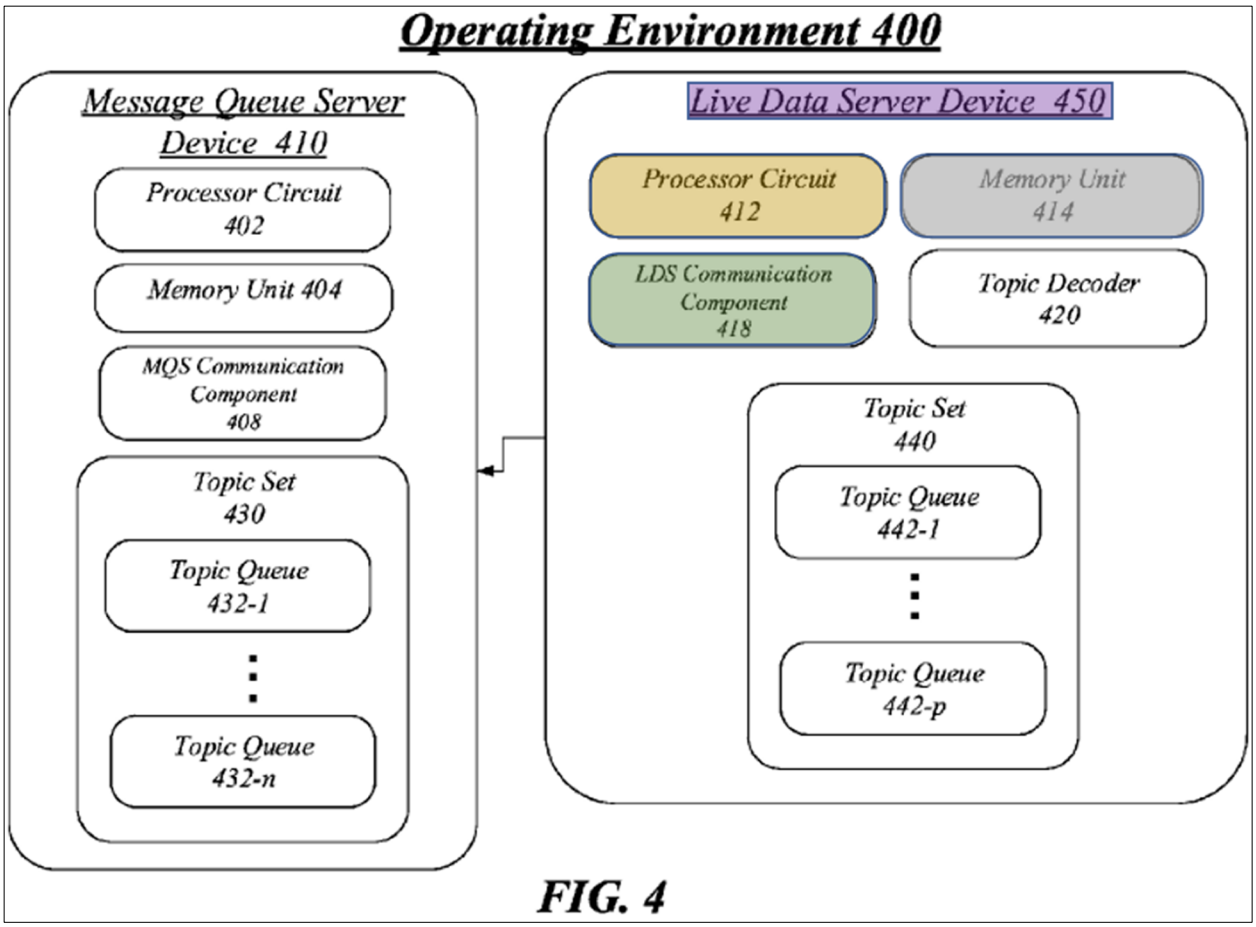
Ellis's SCS comprises one or more processors, memory devices, and communication interfaces. Ex.1001 ¶345. The SCS can be "any suitable content source configured to provide real-time sports scores and game summary information" including a "content manager, content aggregator, or intermediate content provider." *Id.*; Ex.1016 ¶¶42, 142. The SCS periodically retrieves, via the

internet and from an event information provider, first and second event information germane to multiple live sporting events, including score information for each of the multiple live sporting events because the SCS may "provide real-time sports scores and game summary information, … spread and wagering data, and any other sports-related information to user equipment 102." *Id.* ¶41; *see id.* ¶¶72, 117; Ex.1001 ¶345. A POSA would have understood that this information is retrieved via the internet because that is how real-time data was transferred to users at the time of Ellis and Spivey—including score updates and wagering information. Ex.1001 ¶345; *see* Ex.1016 ¶¶42, 142. While a periodic time interval is not mentioned in Ellis, a POSA would have understood that any system that provides real-time sports statistics, such as Ellis, would necessarily update the statistics on a periodic basis. Ex.1001 ¶345. Alternatively, it would have been an obvious design choice to use a periodic update to limit queries to the system and load on the components. *Id*. Further, as depicted in Figure 1, the SCS may store the received "sports-related information … in database 122:"

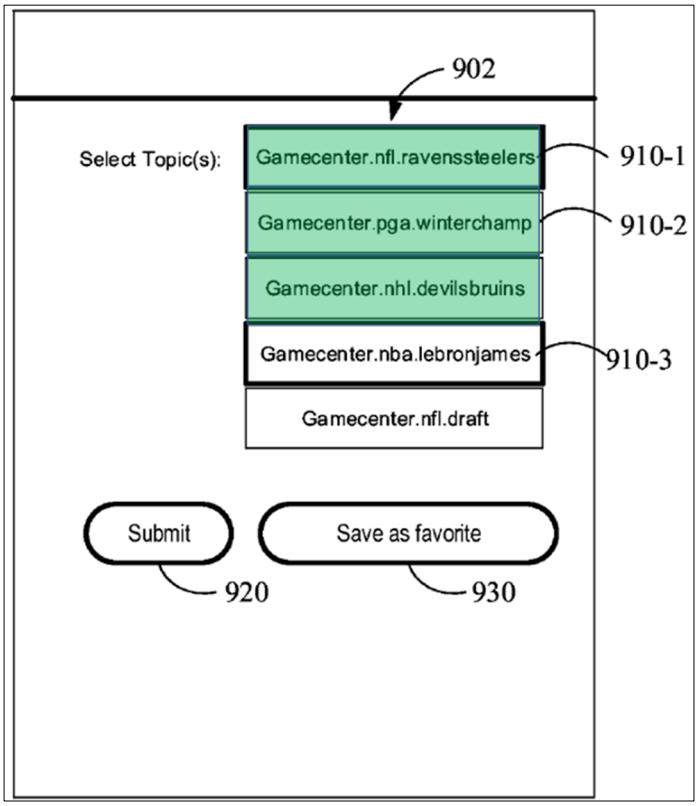


Ex.1016 ¶42, Fig. 1 (annotated).

To the extent Ellis does not expressly disclose or render obvious this limitation, Spivey's LDSD, as shown in Figure 4, contains the same basic components as the '687's control server:



Ex.1017, Fig. 4 (annotated). The LDSD is a generic server comprising one or more processors, memory devices, and communication interfaces. *Id.*; Ex.1001 ¶346. Moreover, the LDSD performs the same functions as the '687's control server. *Id.* The LDSD contains an LDS communication component that allows LDSD "to receive live data and transmit the data payloads to MQS device 410." Ex.1017 ¶55. The live data received by the LDSD includes "sports scores and breaking news" and when related to baseball can include "a score, a play, an error, an injury, a player-at-bat, and so forth:"



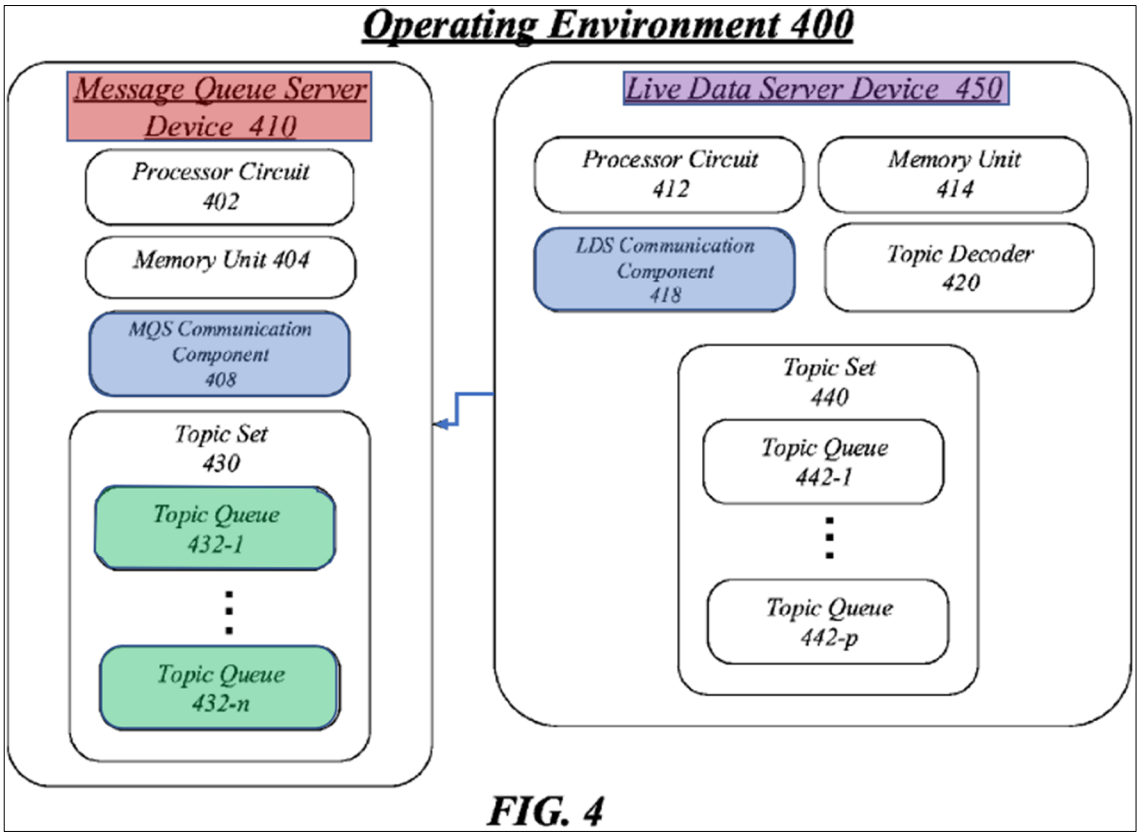
See id. ¶¶27, 48, 66 ("A data payload may include … information about the live event in progress … ."), Fig. 9 (annotated); Ex.101 ¶346. The LDSD retrieves the first event information germane to a first live sporting event including the first score information for the first live sporting event via the internet and from an event information provider because the live data sources are "associated with the live event," and servers in Spivey communicate over the internet. Ex.1017 ¶¶35, 37, 178; Ex.1001 ¶346. Thus, a POSA would have understood that Ellis and Spivey both disclose this limitation. Ex.1001 ¶¶344-46. And, to the extent Ellis's SCS did not meet this claim limitation, a POSA would have replaced Ellis's SCS with Spivey's LDSD and MQSD to decrease latency. Ex.1001 ¶¶374; §VIII.A.1, *supra.*

f. Limitation 19.6

Ellis in view of Spivey discloses a socket server communicatively coupled to the control server (which, as discussed above, is disclosed by Ellis's SCS and Spivey's LDSD). The '687 describes the socket server as a generic server. *See* Ex.1003, 55:15-25. The purpose of the socket server is to "facilitate communication" of "synchronized event information retrieved by the control server" associated with an event between the control server and the VCDs. *Id.* 20:7-21. The socket server does so by using "one or more sockets … dedicated to the particular event" allowing VCDs "to establish an event information channel with the socket server." *Id.* The socket server then receives event information transferred from the control server and shares the event information in "event messages" via the event information channel "in a synchronized manner" to all viewers "following the particular event." *Id.*

Ellis discloses providing event information over a separate connection to user equipment. Ex.1016 ¶¶39-41, Fig. 1. A POSA would have looked to Spivey to add additional backend architecture to reduce latency in the real-time data delivery system. Ex.1001 ¶348. Like the '687's socket server, Spivey's MQSD is a generic server that contains processors, memory, and communication components. Ex.1017 ¶¶35, 53, Figs. 3, 4. Moreover, Spivey's MQSD carries out the same purpose as the '687's socket server. The MQSD "receive[s]" and "process[es] live data to provide live data" to "the subscribed connected client devices substantially simultaneously."

Id. ¶¶36, 96; *see id.* ¶¶45 ("[MQS] device 310 may be a representative example of message queue server 120"), 54 (MQSD is "substantially similar" to "MQS device 310"), 96. To accomplish this, the MQSD receives live event data from the LDSD, which just "receive[d] live data:"



Id. ¶¶54-55, Fig. 4 (annotated). The MQSD is communicatively coupled to the LDSD through the MQS communication component and the LDS communication component. *Id.* ¶¶46 (communication component 308 transmits and receives data),

54 (communication component 408 is analogous to 308), 55 ("LDS communication component 418 … allows [LDSD] to … transmit the data payloads to [MQSD].").[3]

Then, the MQSD organizes the received live data "into one or more of a plurality of topic queues" dedicated to storing information about "a specific game." *Id.* ¶¶47, 52. After sorting the data into the proper topic queues, the MQSD shares the information "substantially simultaneously" to "the subscribed connected client devices." *See id.* ¶96. Thus, a POSA would have understood Spivey's MQSD as disclosing the '687's socket server being communicatively coupled to a control server. Ex.1001 ¶375.

g. Limitation 19.7

Ellis in view of Spivey discloses this limitation. Ex.1001 ¶376. The LDSD (the control server) "receive[s] live data and transmit[s] the data payloads to [MQSD (the socket server)]." Ex.1017 ¶55. Data payloads may include "a score, a player name, a play, and so forth …."

[3] Ellis also discloses a system where multiple servers provide the event information. Ex.1017, ¶47 (SCS's functionality "may be … provided by multiple systems at multiple facilities").

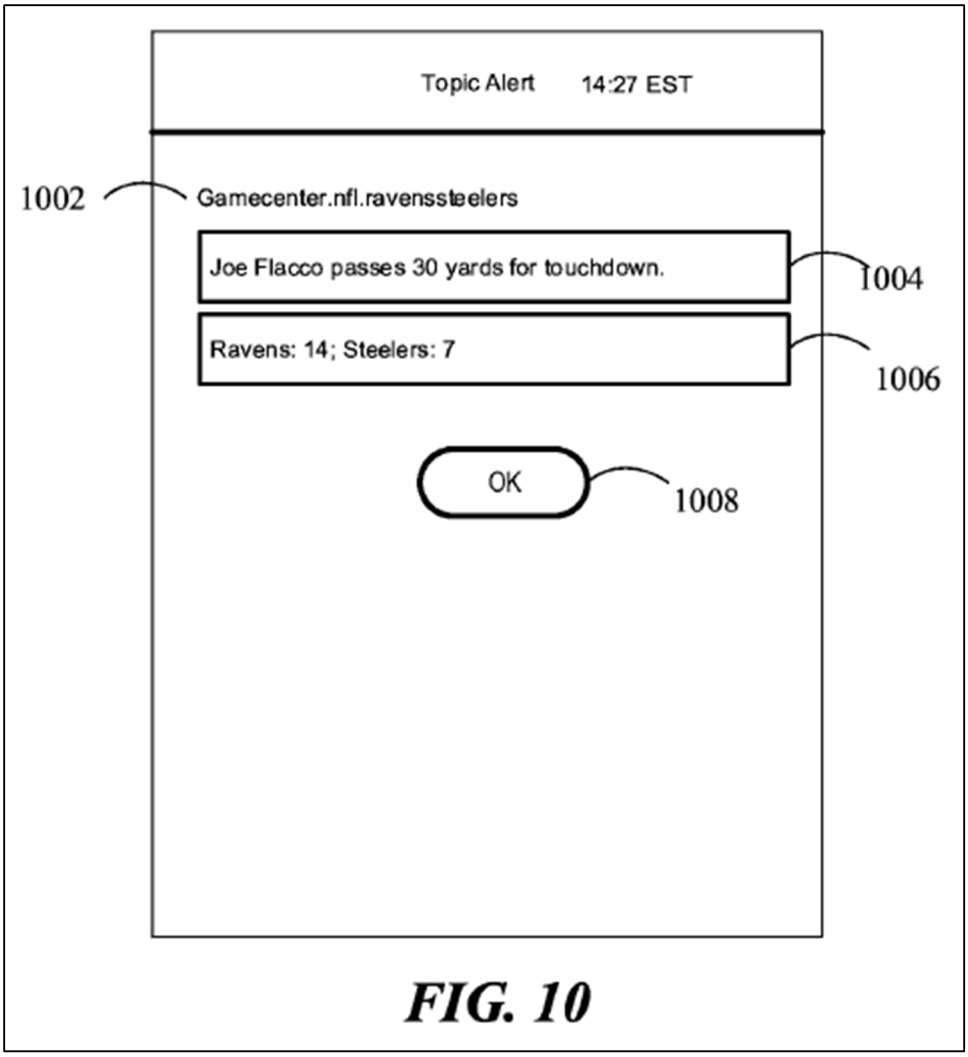


FIG. 10

Id. ¶117, Fig. 10. This includes information from at least two different live events. §§VIII.A.2.e-f, *supra.* Thus, a POSA would have understood that Spivey discloses a socket server receiving from the control server at least the first and second event information. Ex.1001 ¶¶350, 376.

h. Limitations 19.8 and 19.9

i. First/second event socket corresponding to the first/second event information germane to the first/second live sporting event

The '687 explains that the socket server contains "one or more first event sockets 602A dedicated to the first event information." Ex.1003, 21:47-62. The '687's first/second event sockets have corresponding EventIDs that the VCDs "uses … to connect to the socket," *e.g.*, by using a "URL including the … EventID in a path of the URL." *Id.* 21:63-22:8. Thus, a POSA would have understood a "socket" to be a uniquely addressable communication endpoint on a server where first/second event information is provided to VCDs. Ex.1001 ¶352. A first/second event socket corresponding to the first event information germane to the first live sporting event is simply a socket where information about each sporting event is provided to VCDs. *Id.*

In the same way, Spivey's topic queues are "where data payloads are placed" that, for example, "relate to a specific game between two NFL teams." Ex.1017 ¶¶51-52. The data payloads, "[w]hen the live event is a sporting event," include, "for example, a score, a play, …, and so forth." *Id.* ¶48. Topic queues have a corresponding "topic label" which is used "to identify a topic queue." *Id.* ¶49. "A topic label may be, for example" a "text string such as gamecenter.nfl.ravenssteelers." *Id.* ¶66.

Client devices use these topic label text strings to connect and subscribe to MQSD's topic queues. First, client devices "request a live data connection" with the MQSD by "select[ing] or enter[ing] the address or connection information to a

particular" MQSD. *See id.* ¶¶81-82.[4] This "address may resemble a uniform resource locator (URL)." *Id.* ¶82. Second, as shown in Figure 9, client devices can use the topic labels to select "the topics available from [MQSD] in a topic selection list" and "subscribe to" those topic queues, which includes multiple live events:

[4] Spivey often discusses a connection between the client device and the system using a live data access server ("LDAS"), however, Spivey also discloses that the message queue server device may be "accessible to clients over the network directly." Ex.1017 ¶36. For example, "MQS communication component 308 … may push data from topic queues 332-1, 332-n to the subscribers of the topics corresponding to those topic queues." *Id.* ¶46. Also, the system does not require an LDAS, only that it "may include a[n] [LDAS]." *Id.* ¶38. Thus, a POSA would have understood Spivey to disclose a direct connection between the client devices and MQSD. Ex.1001, ¶354. A POSA would have used this implementation because reducing the amount of server transfers would reduce latency, which is Spivey's main purpose.

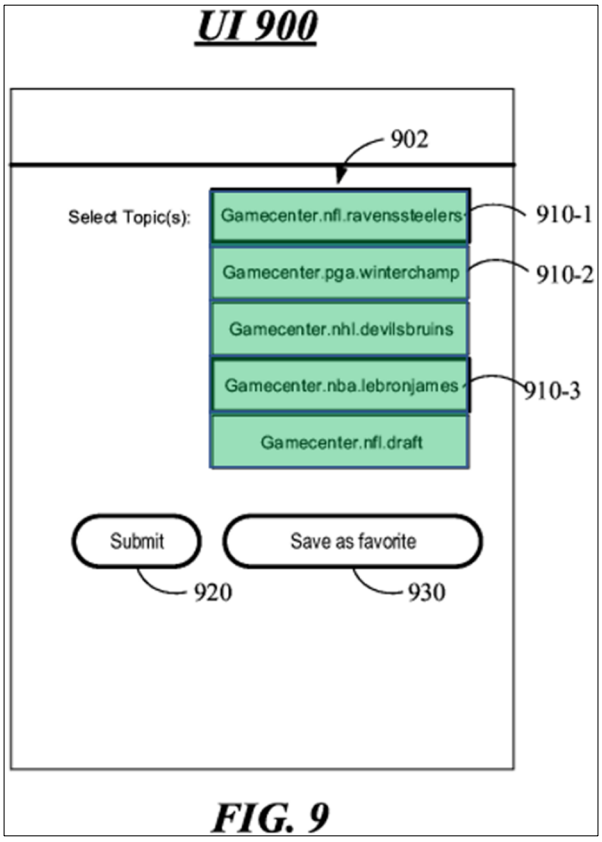


FIG. 9

Id. ¶¶83-84, Fig. 9 (annotated). Third, "the data payload" may be pushed to the subscribed connected devices that requested that topic. *Id.* ¶96. Thus, a POSA would have understood that Spivey's topic queues disclose first/second event sockets corresponding to the first/second event information germane to the first/second live sporting event. Ex.1001 ¶354.

ii. Transmitting the first/second event information to at least the first VCD of the first/second plurality of VCDs

Ellis discloses a first VCD of the first/second plurality of VCDs. *See* §VIII.A.2.d, *supra.* Both Ellis and Spivey further disclose transmitting the first/second event information to the first VCD of the first/second plurality of VCDs.

Ex.1001 ¶355. For example, in Spivey, the MQSD "may push data from topic queues … to the subscribers of the topics corresponding to those topic queues." Ex.1017 ¶46. In Ellis, SCS may be configured "to provide real-time sports scores and game summary information, … to user equipment 102." Ex.1016 ¶41.

iii. Transmitting via a third/fourth Internet communication channel between at least one first/second event socket of the at least one socket server and the first VCD of the first/second plurality of VCDs

Ellis in view of Spivey discloses providing first/second event information over separate internet communication channels. Spivey's entire system is based on providing "live event data in real-time." Ex.1017, Abstract. The MQSD can be an "internet server." *See id.* ¶35. Spivey communicates with client devices over "any … combination of wired and/or wireless networks including … the Internet." *Id.* ¶179. For example, client devices "may request and participate in a websocket connection," which "typically comprises a two-way connection between two entities." *Id.* ¶¶43, 61. Moreover, consistent with Spivey, Ellis discloses providing event information over a separate communication path 152 than the video signal 150. Ex.1017 ¶39-41, Fig. 1. Thus, a POSA would have understood Spivey to disclose transmitting first/second event information via a separate internet connections, or third/fourth connections because the first/second connections provide the video feed. Ex.1001 ¶357.

Further, this information is provided via a connection between a topic queue and the first VCD of the first/second plurality of user devices. Users can access the MQSD using a URL. *See* Ex.1017 ¶¶81-82. Then, the user can access the specific topic queue they wish to receive information from by using a text string, *e.g.*, a topic label or Event ID, associated with a topic queue. *Id.* ¶179, Fig. 9 ("Gamecenter.nfl.ravenssteelers."). Thus, a POSA would have understood that Ellis in view of Spivey discloses distributing event information from a first/second socket to a first user device of a first/second plurality of user devices over an internet connection. Ex.1001 ¶358. Further, a POSA would have understood that the internet connection is established using a URL and text string identifying a uniquely addressable communication endpoint on the MQSD, where first event information is transmitted to a VCD. *Id.*

3. Dependent Claim 20

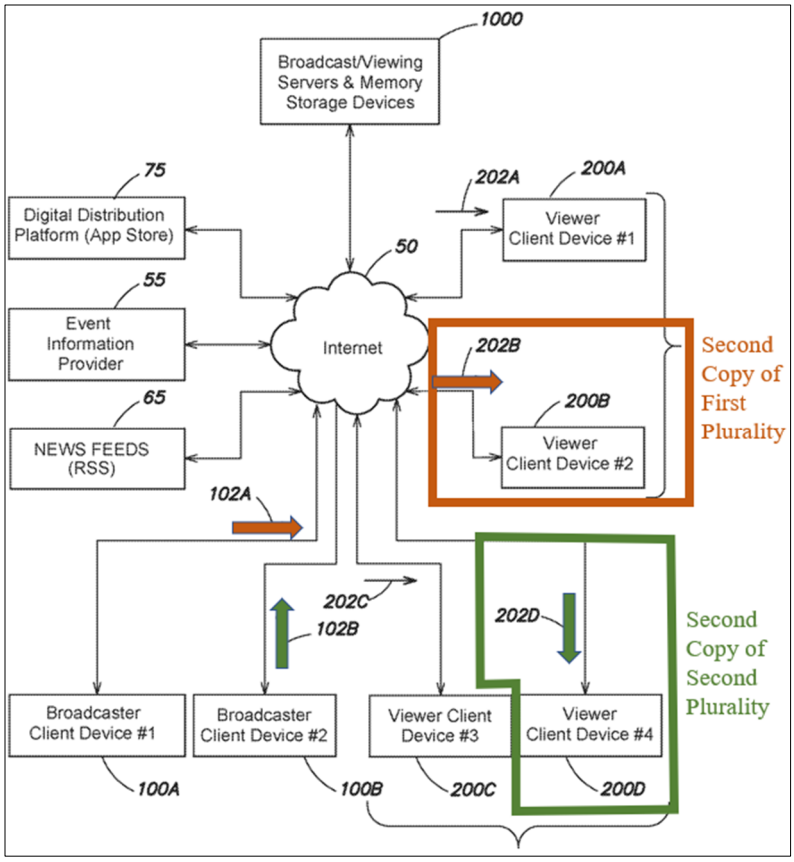
a. Limitations 20.0-20.1

See Claim 19. §VIII.A.2, *supra.*

b. Limitations 20.2-20.3

Ellis in view of Spivey discloses these limitations. Ex.1001 ¶¶379-80. These limitations are substantially the same as limitations 19.3 and 19.4. Specifically, these limitations add providing a second copy, *i.e.*, another copy, of the first/second

plurality of copies to a second VCD of the first/second VCDs via a third/fourth video Internet communication channel:[5]



Ex.1003, 15:22-33, Fig. 1A (annotated).

Ellis discloses these limitations for the same reasons as discussed in section VIII.A.2.d, *supra*. Specifically, Ellis in view of Herzog discloses providing individual copies, to multiple different users, of multiple different broadcaster's live

[5] There is no first/second video Internet communication channel in Claim 19. This is a copy and paste error from Claim 4.

streams of digital content, related to different live sporting events, over individual "video" Internet communication channels. §§VIII.A.2.d, *supra*; Ex.1001 ¶380.

c. Limitations 20.4

See Limitation 19.6. §VIII.A.2.f, *supra.*

d. Limitations 20.5-20.6

Ellis in view of Spivey and Herzog discloses these limitations. Ex.1001 ¶¶382-83. These limitations are substantially the same as limitations 19.8 and 19.9. §VIII.A.2.h. These limitations simply add transmitting the first/second event information, to a second VCD, of the same first/second plurality of VCDs.

Both Ellis and Spivey further disclose transmitting the first/second event information to the second VCD of the previously mentioned first/second plurality of VCDs over an individual third/fourth event Internet communication channels.[6] For example, in Spivey, the MQSD "may push data from topic queues … to the subscribers of the topics corresponding to those topic queues." Ex.1017 ¶46. In Ellis, SCS may be configured "to provide real-time sports scores and game summary information, … to user equipment 102." Ex.1016 ¶41; *see id.* ¶39 ("Any suitable number of users may have one or more user equipment … 102."). Thus, a POSA

[6] There is no first/second event information Internet communication channel in Claim 19. This is a copy and paste error from Claim 4.

would have understood that Ellis in view of Spivey discloses these limitations because both disclose transmitting the first/second event information to multiple VCDs of the first/second plurality of VCDs over separate internet connections. Ex.1001 ¶383.

4. Dependent Claim 21

a. Limitations 21.0-21.2

See Claim 19. §VIII.A.2.

Ellis in view of Spivey discloses transmitting and receiving chat information via individual communication channels between a first/second socket and a first VCD of a first/second plurality of VCDs who are watching different events. §§VIII.B.2.h, VIII.A.2.h, VIII.A.3, *supra.*

Ellis discloses sending and receiving chat information because users "may also leave feedback regarding the commentary that other users in the media system may view when they access the same commentary." Ex.1016 ¶132. A POSA would have understood that Ellis discloses a system that transmits and receives first/second chat information regarding the first/second live stream of digital content. Ex.1001 ¶386; *see also* Ex.1016 ¶126.

Ellis also discloses providing this information on a separate channel to users. Ellis discusses transmitting the video "broadcasts" over communication path 150 and "game summary information, … and any other sports-related information" over communication path 152. Ex.1016 ¶41; *see* §VIII.A.2.h.iii. Ellis provides that in

"some embodiments, this sports-related information is provided to user equipment 102 as a plurality of real-time data feeds." Ex.1016 ¶41. Thus, a POSA would have understood that Ellis discloses transmitting via at least one first/second chat/system event Internet communication channel between at least one first/second chat/system event socket of the at least one socket server and the first VCD of the first/second plurality of VCDs. Ex.1001 ¶387.

Ellis in view of Spivey and Herzog discloses a socket specifically designated for chat/system information. Spivey utilizes topic queues to organize "data payloads" that "relate to a specific game between two NFL teams." Ex.1017 ¶¶51-52; *see* VIII.A.2.h, *supra*. The data payloads, "[w]hen the live event is a sporting event," include, "for example, a score, a play, …, and so forth." Ex.1017 ¶48. Topic queues may be "hierarchically related." *Id.* ¶52. This means that when the system looks at the text string associated with the data payload, the system "may place the data payload only in the topic queue exactly matching the topic label." *Id.* ¶104; Ex.1001 ¶388. For example, if there were two topics "at the same hierarchal level" the data payloads placed in "'gamecenter.nfl.ravenssteelers.statistics' would not be placed in" another topic queue "gamecenter.nfl.ravenssteelers.plays." In sum, the statistics would have been separate from the chat information. Ex.1001 ¶388. Thus, a POSA would have understood Spivey to disclose a first/second chat/system event

socket corresponding to the first/second chat information related to the first/second live stream of digital content. *Id*.

5. Dependent Claim 22

a. Limitation 22.0

See Claim 21. §VIII.A.4, *supra*.

b. Limitations 22.1-22.5, 22.7

Ellis in view of Spivey discloses these limitations. Ex.1001 ¶390. These limitations are substantially the same as limitations 20.1-20.6 except that limitations 22.5 and 22.7 contain a repeated phrase which does not change the meaning of the limitations. Ex.1003, Claim 20 ("[T]ransmits at least the second event information to …."), 22 ("[T]ransmits at least the second event information of the second event information to…"); Ex.1001 ¶390. Thus, a POSA would have understood that Ellis in view of Spivey discloses these limitations for the same reasons as stated above. §§VIII.A.3, *supra*.

c. Limitations 22.6 and 22.8

Ellis in view of Spivey discloses these limitations. Ex.1001 ¶391. These limitations are substantially the same as limitations 21.1 and 21.2. Ex.1003, Claim 21. But these limitations further require that the first/second chat information is sent to a second VCD of the first/second plurality of VCDs. *Id.* Also, the slight difference in word choice, *e.g.*, "first live sporting event video-based commentary" versus "first live stream of digital content," does not change the meaning of the claim, as this

claim depends on claim 21, and the first/second chat information is already defined therein. Ex.1001 ¶391.[7] Thus, a POSA would have understood that Ellis in view of Spivey discloses these limitations for the same reasons as stated above. §VIII.A.4.a, *supra*.

6. Independent Claim 23

a. Limitation 23.0

Ellis discloses this limitation. Ex.1001 ¶392. This limitation is substantially the same as limitation 19.0. Claim 23 is a method claim implementing the system of Claim 19. *Id*. Thus, a POSA would have understood that Ellis discloses this limitation for the same reasons stated above. §VIII.A.2, *supra*; Ex.1001 ¶392.

b. Limitation 23.1

Ellis and Spivey disclose this limitation. Ex.1001 ¶393. This limitation is substantially the same as limitation 19.3. The claim language is slightly altered, but the claims contain the same limitations. *Id*. Thus, a POSA would have understood that Ellis and Spivey disclose this limitation for the same reasons stated above. §§VIII.A.2.b-d, *supra*; Ex.1001 ¶393.

[7] This is likely due to yet another copy and paste error, this time from an entirely different patent, the ’697. Ex.1007, Claim 22.

c. Limitation 23.2

Ellis in view of Spivey discloses this limitation. Ex.1001 ¶394. This limitation is substantially the same as limitation 19.5. The claim language is slightly altered, but the claims contain the same limitations. *Id*. Thus, a POSA would have understood that Ellis in view of Spivey discloses this limitation for the same reasons stated above. §VIII.A.2.e, *supra*; Ex.1001 ¶394.

d. Limitation 23.3

Ellis in view of Spivey discloses this limitation. This limitation is substantially the same as limitation 19.8. Ex.1001 ¶395. The claim language is slightly altered, but the claims contain the same elements. *Id*. Thus, a POSA would have understood that Ellis discloses this limitation for the same reasons stated above. §§VIII.A.2.f-h, *supra*; Ex.1001 ¶395.

7. Dependent Claim 24

a. Limitation 24.0

See Claim 23. §VIII.A.6, *supra*.

b. Limitation 24.1

This limitation is substantially the same as limitation 21.1. The claim language is slightly altered, but the claims contain the same limitations. Ex.1001 ¶397. Thus, a POSA would have understood that Ellis discloses this limitation for the same reasons stated above. §VIII.A.4, *supra*; Ex.1001 ¶397.

8. Dependent Claim 25

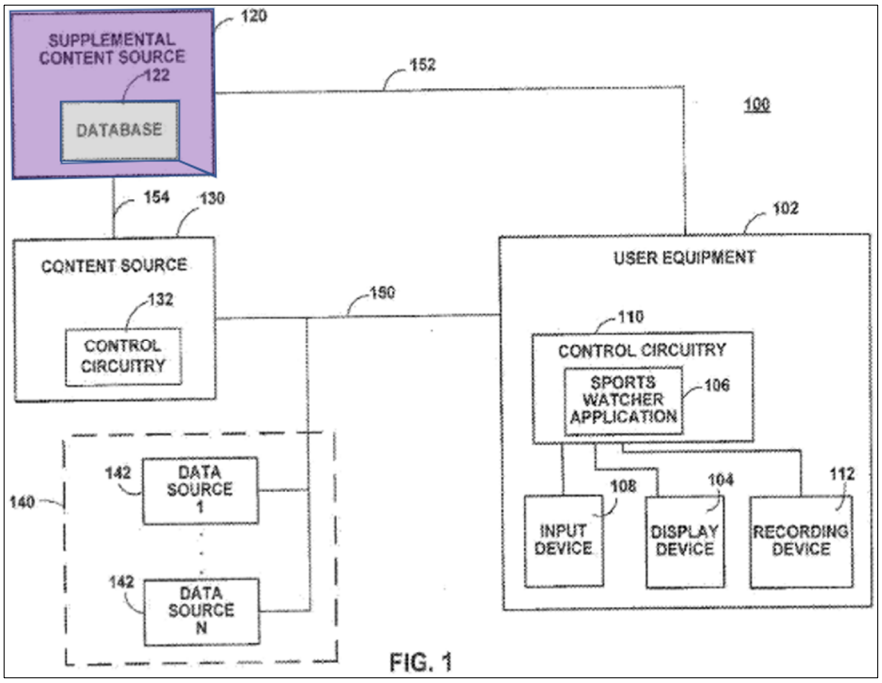
a. Limitation 25.0

See Claim 23. §VIII.A.6, *supra*.

b. Limitation 25.1

Ellis and Spivey both disclose this limitation. Ex.1001 ¶399. Both Ellis and Spivey disclose a control server periodically retrieving real-time information from the event information provider that includes event information. *See* Ex.1017 ¶48 (score, play, error, and at-bat updates); §§VIII.A.2.e, *supra*; Ex.1001 ¶399. This claim further requires that the system update the control server's memory storage system with the event information details that were periodically retrieved. Ex.1001 ¶623.

Ellis and Spivey both disclose a memory system, including a database, communicatively coupled to the control server. Ex.1001. ¶360. The '687 explains that the database must be capable of storing "information." *See* Ex.1003, 17:34-55. Thus, a POSA would have understood that the '687's database is a generic server where an organized collection of structured data is stored. Ex.1001 ¶360. In the same way, as shown in Fig. 1, Ellis's SCS is communicatively coupled to a database that stores "some or all of this sports related information" as well as "network viewing statistics and editor picks of sporting events:"



Ex.1016 ¶¶42-43, 47 (SCS's "functionality may be provided by multiple systems at multiple facilities"), Fig. 1 (annotated). Spivey also discloses a memory unit, including a database, communicatively coupled to the control server, Spivey's LDSD, as shown in Figure 4:

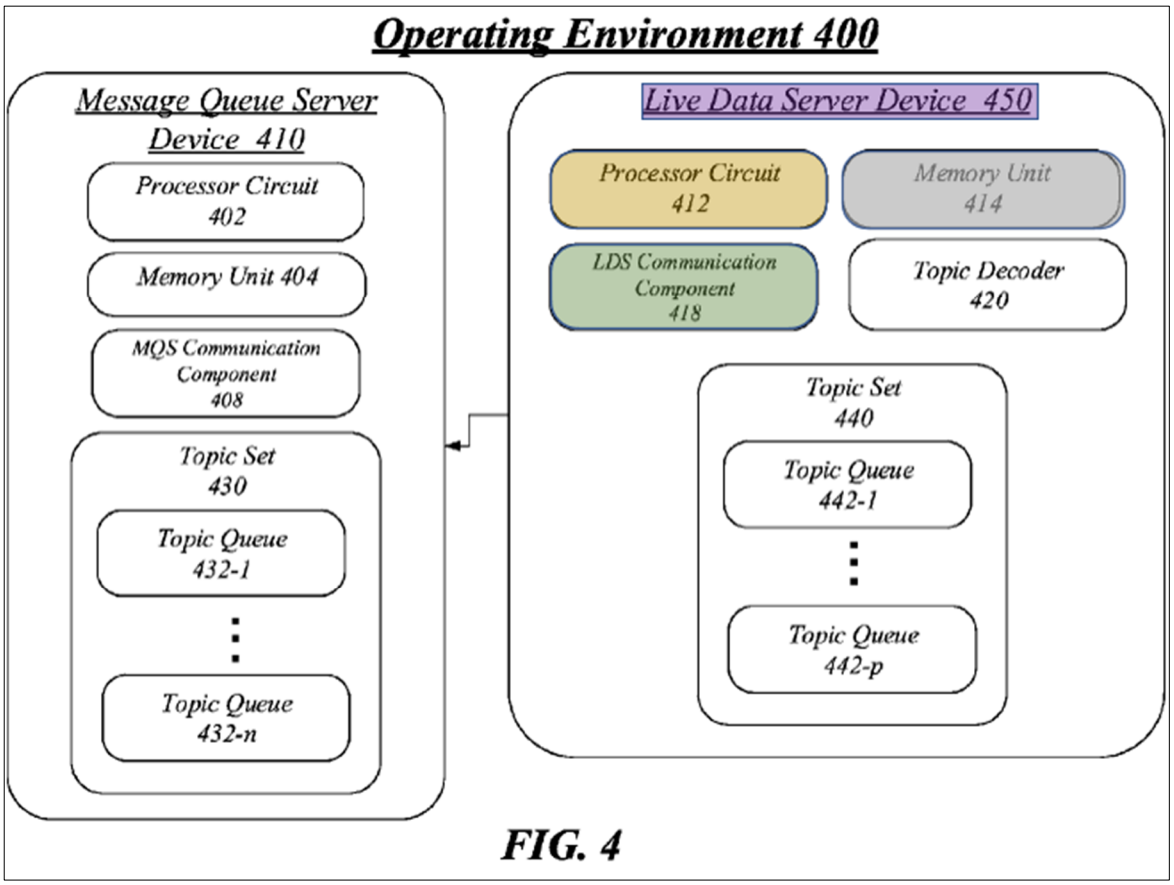


FIG. 4

Ex.1017, Fig. 4 (annotated). Spivey discloses that the LDSD's memory units may be "higher speed" units such as "solid state drives (SSD) and any other type of storage media suitable for storing information." *Id.* ¶167; *see id.* ¶161 ("[C]omputing architecture 2300 may comprise … an electronic device" such as "those described with reference to Figs. 1-5."). Spivey notes that data "may be stored on [LDSD] 450." *Id.* ¶¶56-57. Further, it would have been obvious for a POSA to store (update) this information in the LDSD for redundancy. Ex.1001 ¶369. Thus, a POSA would have understood that Ellis's database and Spivey's memory units disclose memory systems for "updating the event information." Ex.1001 ¶362.

c. Limitation 25.2

Ellis in view of Spivey discloses this limitation. Ex.1001 ¶368. A POSA would have understood that this limitation requires that for each first event information update at the control server, the control server readies a message including the first event information, that will be processed and sent to the socket server's first event socket in turn. *Id*.

In the same way, Spivey's LDSD "may have its own topic set and topic queues." Ex.1017 ¶56. "Upon receiving a message," *e.g.*, live event data, the LDSD "may sort the data payload of message 602 into a topic queue, such as topic queue … 442-1." *Id.* ¶67. Then, the LDSD may "transmit the data payloads" to MQSD's topic queues:

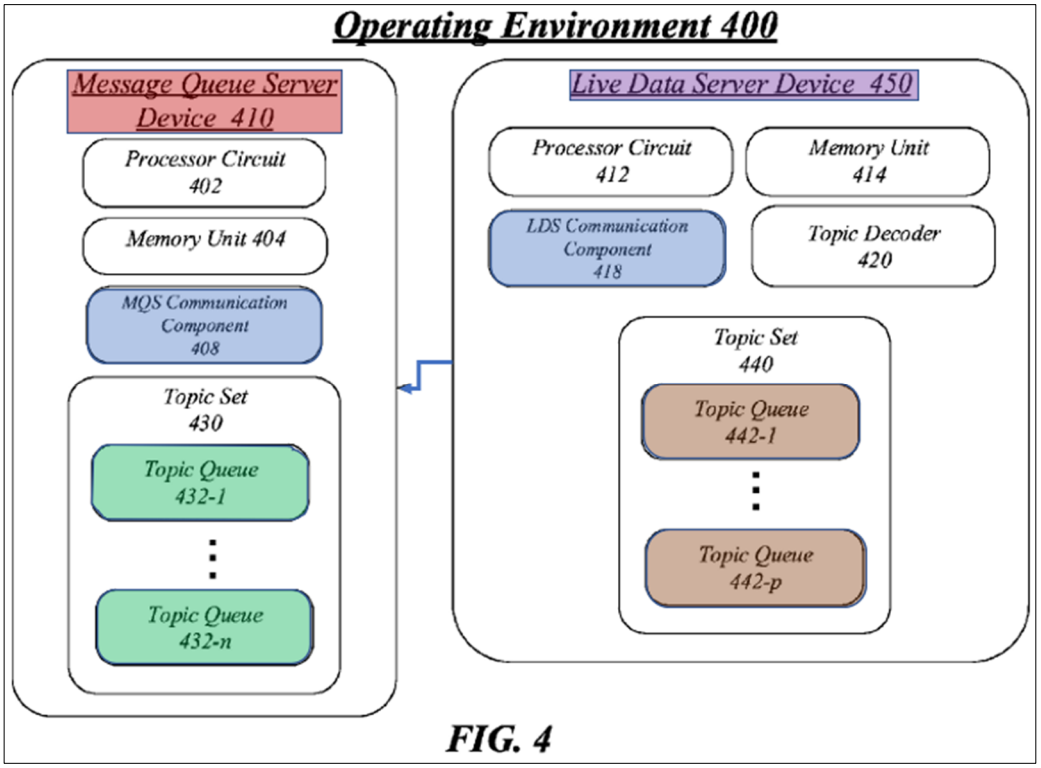


FIG. 4

See id. ¶¶55-56, Fig. 4 (annotated).

Further, Spivey explains that "topic queues may be a queue data structure, in particular a first-in-first out queue, where data payloads are placed." *Id.* ¶51. In other words, the data is placed in the LDSD's topic queue, and is processed in the order that it is received, just like the '687 describes this limitation. Ex.1001 ¶369. Thus, a POSA would have understood that when the LDSD places the updated real-time data in the topic queues for transmission to the MQSD's topic queues, it is in fact queueing an asynchronous message, including the updated first event information, for transmission to the at least one first event socket of the at least one socket server. *Id*.

9. Independent Claim 27

a. Limitation 27.0

See Limitation 19.0. §VIII.A.2.a, *supra.* Ellis's figure 30 also discloses this limitation:

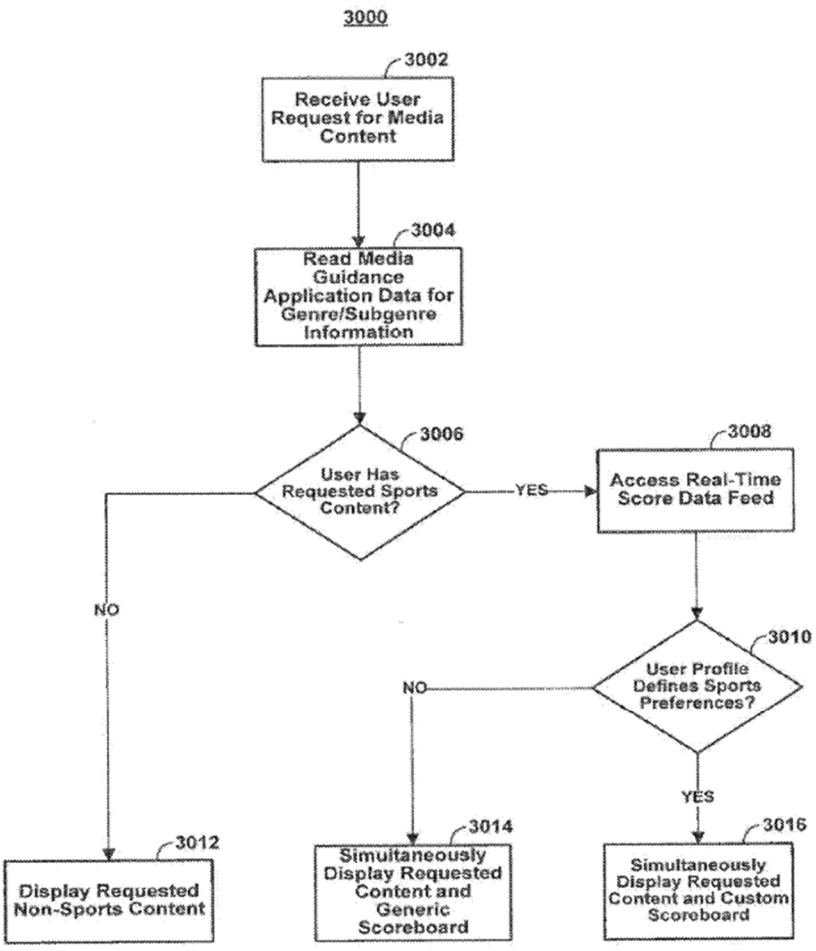


FIG. 30

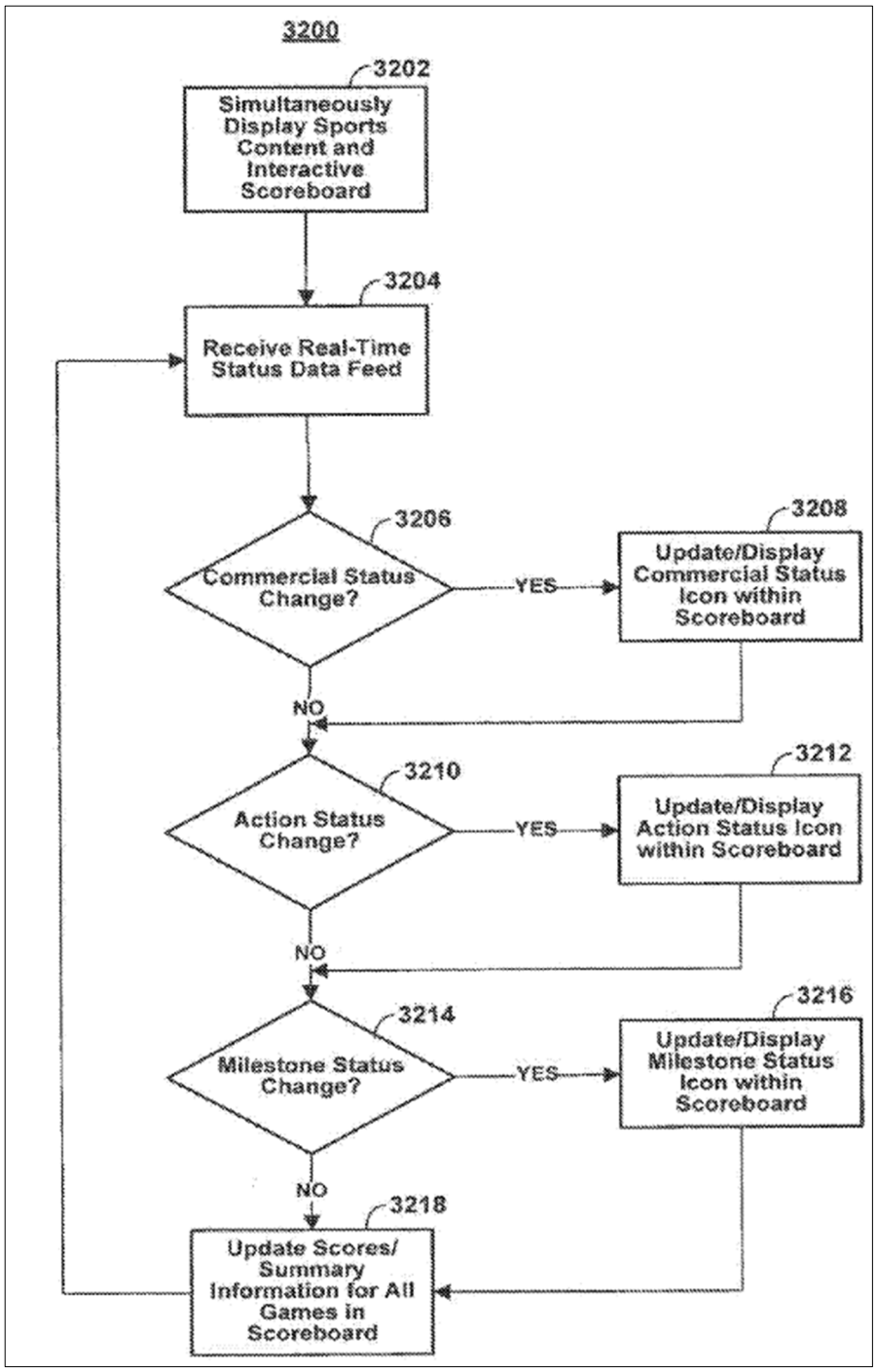
Ex.1016, Fig. 30; Ex.1001, ¶400.

b. Limitation 27.1

See Limitations 19.1-19.4 and Ellis's figure 30. §§VIII.A.2.b-d, *supra*; Ex.1016, Fig. 30.

c. Limitations 27.2 and 27.3

See Limitations 19.5-19.9 and Ellis's figure 30. §§VIII.A.2.e-h, *supra*. Ellis's figure 32 and Spivey's Figures 12 and 13 also discloses these limitations:



Ex.1016, Figs. 30, 32; Ex.1017, Figs. 12-13; Ex.1001, ¶402.

10. Dependent Claim 28

a. Limitation 28.0

See Claim 27. §VIII.A.9, *supra*.

b. Limitation 28.1

See Claim 21. §VIII.A.4.a, *supra*. Ellis's figures 30 and 32 and Spivey's figures 12 and 13 also disclose this limitation. Ex.1016, Figs. 30, 32; Ex.1017, Figs. 12-13; Ex.1001, ¶404.

11. Dependent Claim 29

a. Limitation 29.0

See Claims 25 and 27. §§VIII.A.8, VIII.A.9, *supra.*

12. Dependent Claim 30

a. Limitation 30.0

See Claim 27. §VIII.A.9, *supra.*

b. Limitation 30.1

Ellis discloses this limitation. The '687 explains that an HLS mother server is a generic "computer server" comprising known components such as "processors, memory, and … communication interfaces." Ex.1003, 19:17-47; *see id.* 27:40-49. This HLS mother server is simply capable of receiving and transmitting an HLS file suite, *i.e.*, a "broadcaster's live stream." *Id.* 27:40-62, 28:15-33. HLS is a data transmission format adopted in 2009 to provide video feeds over the internet. Ex.1028, 1.

Ellis teaches streaming video from content source 130, *e.g.*, an "Internet or network media/web server" to a client device, over the internet. Ex.1016 ¶¶40, 74 ("For IPTV, tuned content may include content to be delivered on a particular

network address … on which an IP socket is currently joined."). Thus, a POSA would have understood that Ellis, filed in 2014, teaches using all forms of standard internet transmission protocols, including HLS streaming. Ex.1001 ¶408.

c. Limitation 30.2

Ellis discloses this limitation. Ex.1001 ¶409. The '687 explains that Figure 8 depicts "HLS server architecture:"

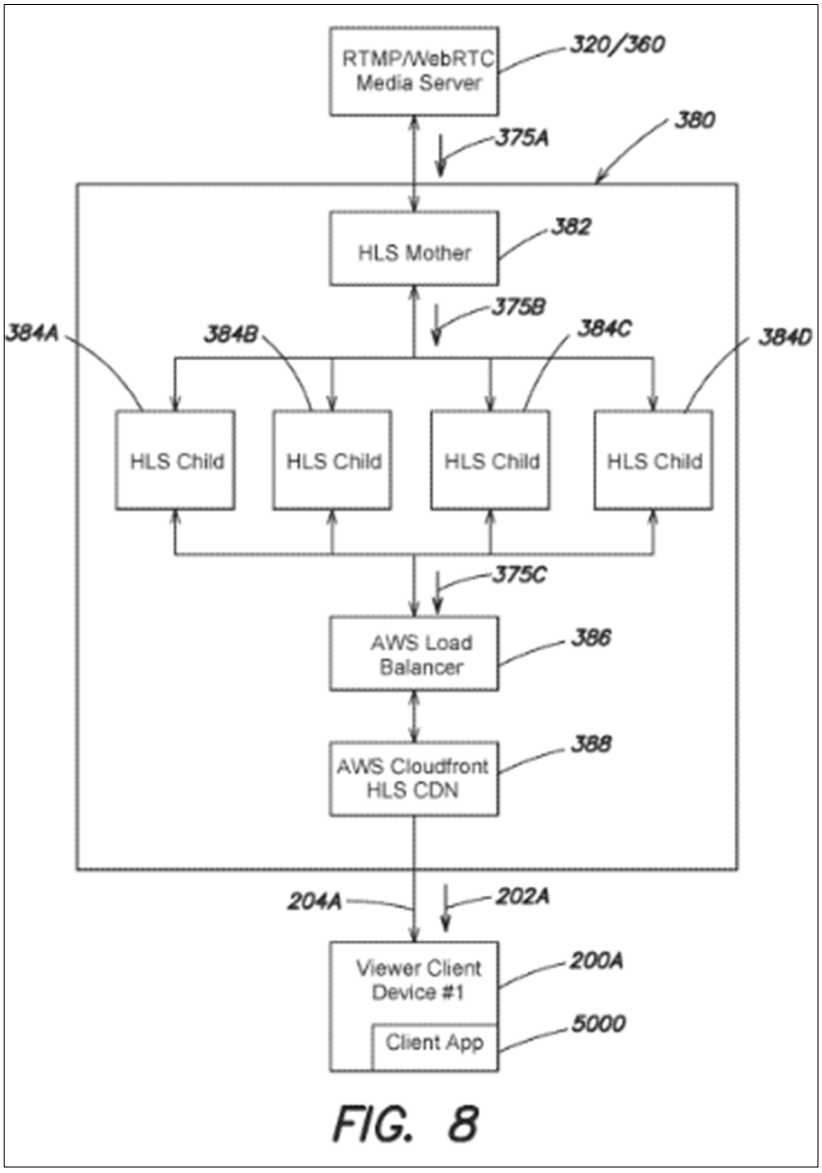


FIG. 8

Ex.1003, Fig. 8. As shown in Figure 8, HLS child servers receive the video feed from a mother server. *Id.* An HLS child server is a generic server capable of streaming an HLS file suite. *See id.*, 19:17-23, 27:40-49. After receiving the HLS file, the child servers "pass on copies 375C … to one or more geographically distributed servers" that are "serving as an HLS CDN." *Id.* 39:58-40:15. The '687 recognizes that this HLS CDN is a "conventional (e.g., global) CDN" that then "served" "streams … to multiple viewers." *Id.*

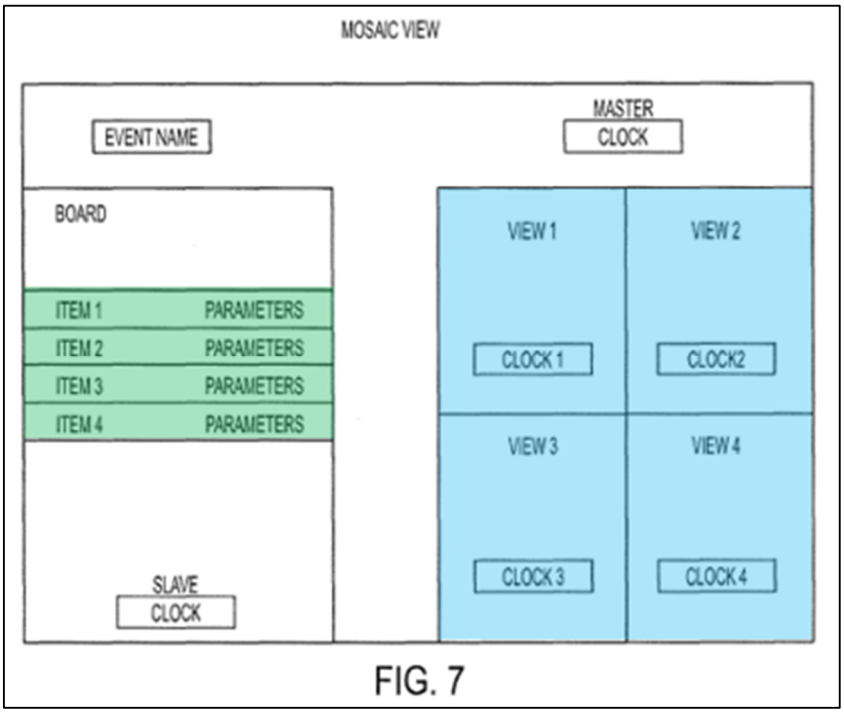
Ellis discloses a generic server and system that streams copies of an HLS file suite to user devices over a communication channel between the CDN and user device. §§VIII.A.2, VIII.A.12.b, *supra.* Moreover, Ellis discloses a content source that provides video feeds utilizing "multiple systems at multiple facilities," *e.g.*, child servers. Ex.1016 ¶47; Ex.1001 ¶410. Further, Ellis discloses an "entire media system or network." Ex.1001 ¶77. Necessarily, such a system would utilize a conventional CDN, as recognized in the '687. Ex.1001 ¶410. Thus, a POSA would have understood Ellis discloses this limitation. *Id*.

B. Ground 2: Claims 19-25, 27-30 Are Obvious Over Herzog in View of Ellis and Spivey

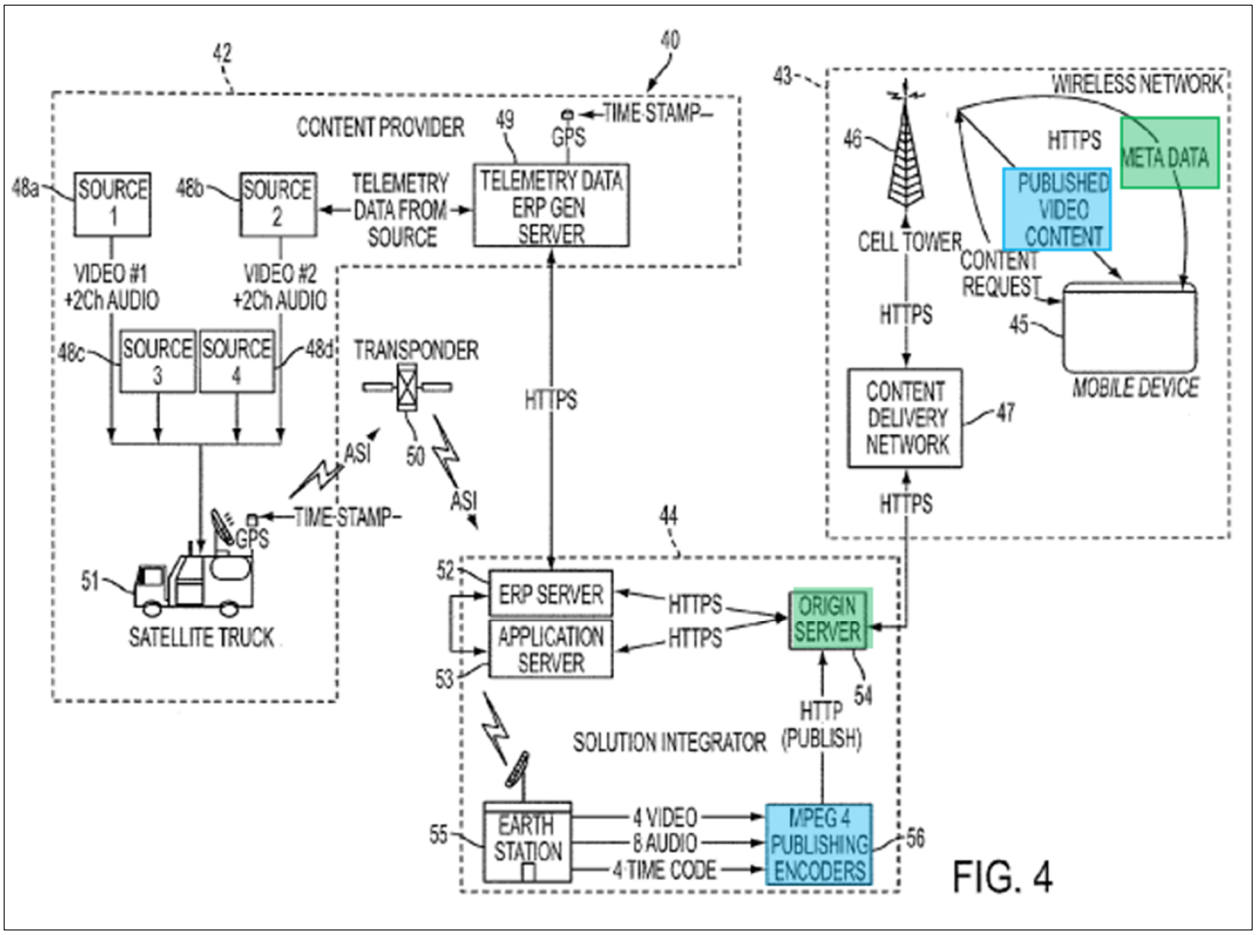
1. Motivation to Combine

Herzog discloses a system for viewing multiple videos related to the same sporting event in addition to live information about the event (meta-data). Ex.1001

¶¶80-87. For example, Figure 7 shows "four different videos of a live event and meta-data of multiple parameters" from which a user can select:



Ex.1015 ¶¶12, 80-81, Fig.7 (annotated). Herzog provides these video and data streams over separate connections:



Ex.1015 ¶¶48-52, 67, Figs. 4 (annotated), 6; Ex.1001¶¶125-131.

a. Socket Server (Spivey)

Herzog does not specifically disclose some backend server architecture supporting the data distribution—the claimed socket server. Ex.1001 ¶126. However, a POSA would have known that the websocket client-server communication protocol employed by Spivey was an alternative to the HTTP polling used by Herzog. Ex.1001 ¶¶142-143; §IV.B. A POSA would have found it obvious to implement Herzog's Origin Server as a websocket server, as taught by Spivey, to

achieve full-duplex communications between a client and a remote host with low latency. Ex.1001 ¶¶80-87.

As noted above, *see* §VIII.A.1, a POSA would have understood that socket servers were well-known components for implementing real-time data delivery, such as in Herzog, with reduced latency. Ex.1001 ¶¶52-53; §IV, *supra*; Ex.1017 ¶¶96, 35. A POSA also would have appreciated the benefits associated with Spivey's MQSD (*i.e.,* "socket server") which establishes websocket connections with client devices, including convenient and efficient full-duplex communications between a client and a remote host with low latency. Ex.1017 ¶¶27-28, 43, 61, 74, 92, 96; Ex.1001 ¶144 (citing Ex.1046); §IV.B. A POSA, looking to improve Herzog's latency issues, would have looked to implement a system such as Spivey. Ex.1001 ¶144.

A POSA would have done so by incorporating Spivey into Herzog's current data delivery system by implementing Spivey's MQSD at Herzog's Origin Server to achieve a predictable result of decreased latency data delivery. *See* Ex.1015 ¶¶50-51, Fig. 4; Ex.1017, Fig. 4; Ex.1001 ¶145. The combined system would maintain Herzog's video content delivery system and upgrade the data delivery system to reduce latency. Ex.1001 ¶145.

A POSA would have been motivated to combine Herzog with Spivey for many of the same reasons that a POSA would have been motivated to combine Ellis with Spivey. First, Herzog and Spivey relate to the same subject matter—content

delivery for real-time events. *See* Ex.1017, Abstract; Ex.1015, Abstract. Both references describe methods and/or systems for streaming video and/or event data to one or more users, such that video and/or event data are transmitted simultaneously. *See, e.g.*, Ex.1017, Abstract; Ex.1015, Abstract; Ex.1001 ¶146. Second, the references solve the same or similar problems, namely, providing video and/or event data to multiple users over the Internet quickly. *See, e.g.*, Ex.1017 ¶27; Ex.1015 ¶¶3, 19, 51.

A POSA would have had a reasonable expectation of success in combining Herzog with Spivey because Spivey contemplates being implemented in a digital content delivery system such as Herzog, stating that it can be used with "any well-known communication techniques and protocols, such as techniques suitable for use with packet-switched networks (e.g., public networks such as the Internet, private networks such as an enterprise intranet, and so forth) . . . ." Ex.1017 ¶155; Ex.1001 ¶147.

A POSA would have been motivated to combine Herzog with Spivey because Spivey provides a complementary solution describing the details of the backend architecture for organizing and transmitting event data to multiple users. Ex.1017, Abstract; Ex.1001 ¶147.

Combining certain portions of Herzog and Spivey would have been obvious because doing so would require only the simple substitution of known elements for

another to obtain predictable results. Ex.1001 ¶148. Herzog encourages this flexibility, stating that it encourages "modifications … in various forms and examples, and that the teachings may be applied in numerous applications." Ex.1015 ¶90. To a POSA, it would have been obvious to substitute any of Herzog's meta-data distribution elements with any combination of Spivey's LDSD, MQSD, and/or Live Data Source(s), which are similarly involved in transmitting live event data to users and may be configured in any manner. *See* Ex.1017 ¶34; Ex.1001 ¶148.

b. Multiple Events (Ellis)

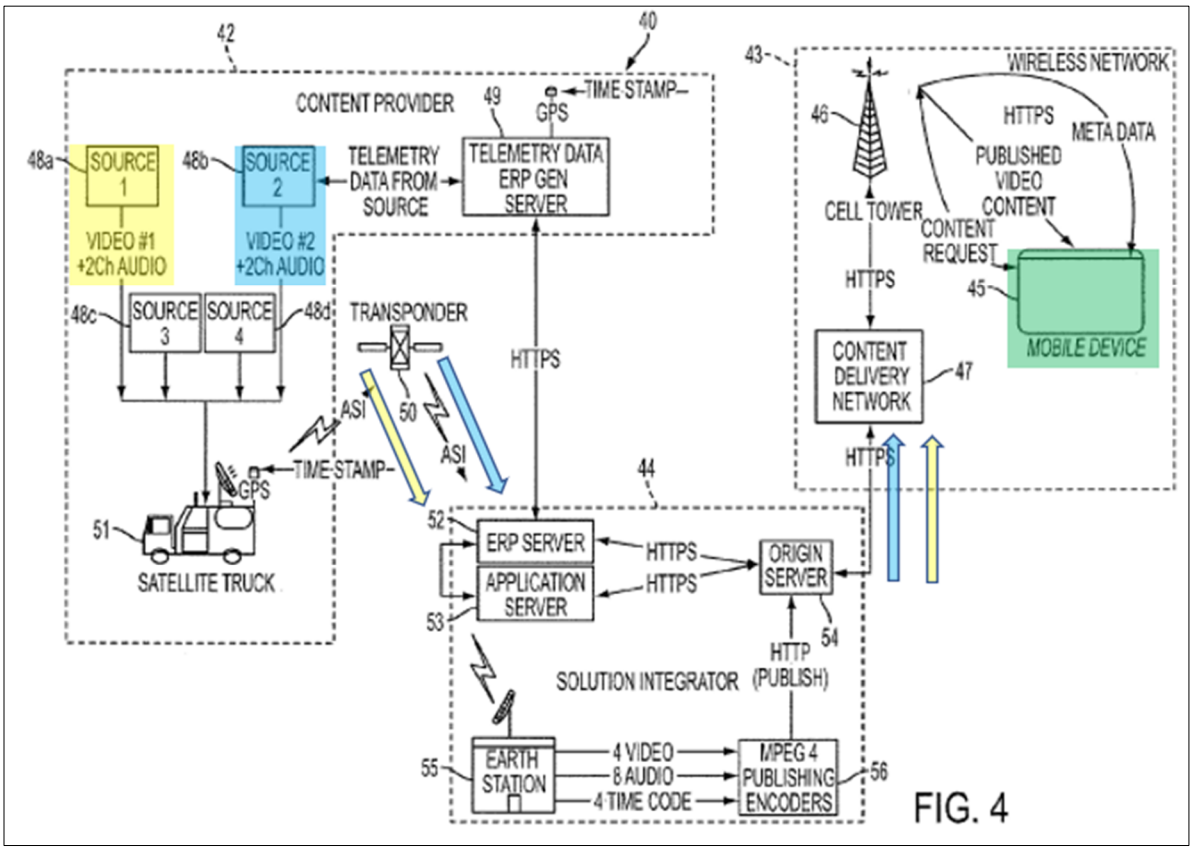
To the extent Herzog does not specifically describe multiple live event streaming, a POSA would have found it obvious to implement such functionality into Herzog/Spivey, as taught by Ellis. Ex.1016 ¶¶39-41, Fig. 2B; Ex.1001 ¶¶155-57; *see* §VII.A, *supra*. A POSA would have understood that Herzog was already equipped to provide multiple different live video and meta-data streams, so configuring this system to provide multiple events would have been obvious and well within the skill of a POSA. Ex.1001 ¶157. A POSA would have been motivated to configure Herzog with Ellis's multiple event functionality because a POSA would have understood that users would enjoy having more content options, *e.g.*, multiple live event streams, chat information, and advertising content. Ex.1016 ¶¶39-41, 62, Figs. 1, 2B; Ex.1001 ¶157.

Furthermore, a POSA would have understood that adding a second live event to Herzog (among other content types), which already provides multiple live streams, applies a known technique to a known device that was ready for improvement to yield a predictable result. Ex.1001 ¶158. A POSA would have had a reasonable expectation of success in providing multiple event functionality because Ellis specifically contemplates being implemented in a content delivery system such as Herzog, stating that it can be used with "any suitable source of media content," which includes IPTV content "delivered on a particular network address (e.g., multicast address) on which an IP socket is currently joined." Ex.1016 ¶¶39-40, 74; Ex.1001 ¶¶158-63.

2. Independent Claim 19

a. Limitation 19.0

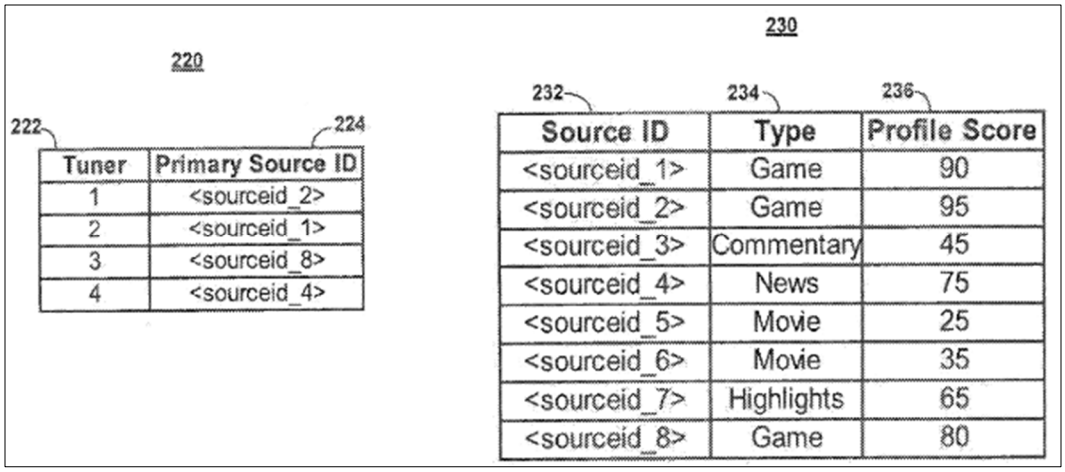
Herzog provides "live video and audio data" to user devices over a "communication network." Ex.1001 ¶510; *see* Ex.1015, Abstract. Herzog improves on traditional "sports application systems" where the meta-data is included "as part of the video broadcast." Ex.1015 ¶83. Herzog includes providing "multiple video/audio streams of race cars and drivers, as they are imaged at different locations on the race track:"



Ex.1015 ¶45, Fig. 4 (annotated). The above system focuses on one live event, an Indy Car Race. *Id.* ¶45. The system makes these video feeds available to "mobile stations" and other "similar users." *Id.* ¶19. Each user can then request video from "one or more channels of video/audio for viewing a live event." *Id*. ¶70. The user then "receives both the video/audio stream" using HLS. *Id.* ¶51. Thus, Herzog provides a system where multiple different users can select the same, or different, live stream of digital content that relates to a live sporting event. Ex.1001 ¶¶444-45.

Further, Ellis expands on Herzog's system by providing multiple live streams of digital content that is of two different live sporting events. Ex.1016. ¶¶62-63, Fig.

2B. Figure 2B, below, shows sporting events available at the same time to any number of users.



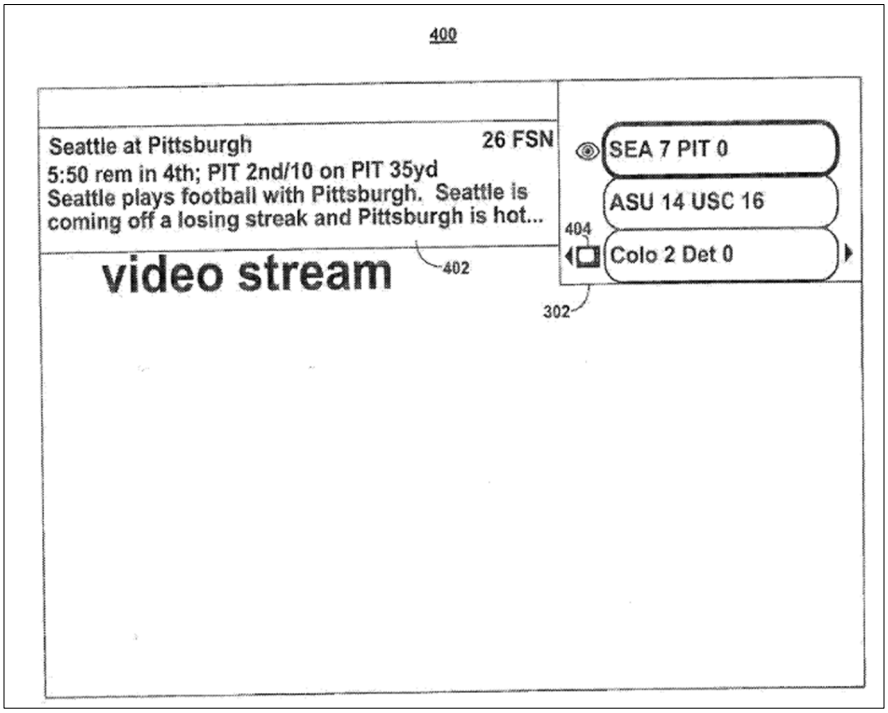
220

222 Tuner	224 Primary Source ID
1	<sourceid_2>
2	<sourceid_1>
3	<sourceid_8>
4	<sourceid_4>

230

232 Source ID	234 Type	236 Profile Score
<sourceid_1>	Game	90
<sourceid_2>	Game	95
<sourceid_3>	Commentary	45
<sourceid_4>	News	75
<sourceid_5>	Movie	25
<sourceid_6>	Movie	35
<sourceid_7>	Highlights	65
<sourceid_8>	Game	80

Id. ¶¶62-63, Fig. 2B. The available games include multiple different live sporting events:



Id. Fig. 4; Ex1001 ¶510.

b. Limitation 19.1

Herzog in view of Ellis discloses this limitation. Ex.1001 ¶511. Herzog discloses multiple MPEG 4 Publishing Encoders ("Encoders") as a plurality of media sources. Ex.1015 ¶48; Ex.1001 ¶446. These encoders receive all of the video and audio data from the live event. *Id.* ¶¶46 (any form of communication technologies may be used to send video/audio data to MPEG Publishing Encoders), 49. The Encoders can "encode" the video and audio data and then the "encoded video is then published to the content delivery network 47 (for example) via IP utilizing [] HLS." *Id.* ¶¶49, 55. Moreover, as explained below, Herzog's content sources perform the same functions as the media sources as recited in limitations 19.2-19.4; Ex.1001 ¶511.

c. Limitation 19.2

Herzog in view of Ellis discloses this limitation. Ex.1001 ¶512. Herzog's Encoders receive all the video and audio data from the live event. Ex.1015 ¶49. Herzog discloses that the audio and video data can be provided to the Encoders using "communications technologies for communicating multiple video and audio streams." *Id.* ¶46. Adding Ellis's multiple live event functionality would make it so the Encoders receive multiple videos of multiple events, but it would not change the above architecture. Ex.1001 ¶447. Thus, Herzog discloses content sources that receive multiple live streams of content related to a first/second live event. *Id*.

d. Limitations 19.3 and 19.4

Herzog in view of Ellis discloses this limitation. Ex.1001 ¶513.

i. First VCD of the first/second plurality of VCDs

Herzog discloses providing multiple different users with the option to select any of the available video feeds. Ex.1015 ¶70. Ellis adds that these streams would be of different live events. §VIII.B.2.a. As would have been obvious in a content distribution scheme such as Herzog that provides at least four different video streams, two or more users would select a first event to stream, and two or more different users would select a second event to stream, *e.g.*, the broadcast from their favorite driver's car. Ex.1015 ¶¶46, 70; Ex1001 ¶449. This would create a first and second plurality of VCDs where each plurality contains a first VCD. Ex.1001 ¶449. Thus, Herzog discloses multiple first users of multiple different pluralities of VCDs. *Id*.

ii. First copy of first/second plurality of copies

Herzog provides the selected video stream to each user individually via HLS. Ex.1015 ¶51. Thus, a POSA would have understood that each user device receives their own copy of the video stream. Ex.1001 ¶450. This would create a plurality of copies being distributed, where the first copy is sent to the first user, and so on and so forth. Thus, each user would receive an individual copy of the live stream of digital content. Ex.1001 ¶450.

iii. Providing copies via a first/second Internet communication channel

Herzog discloses providing individual copies of multiple different live streams to multiple groups of client devices. §§VIII.B.2.d.i-ii, *supra*; *see* Ex.1001 ¶451. Herzog further discloses providing video content over an Internet communication channel via HLS, *i.e.*, an internet connection. Ex.1015 ¶51. Thus, Herzog discloses that each user receives an individual copy from the Encoders over a video internet communication path that is unique to each user device. *Id.* ¶¶2 (user devices "are used mainly for viewing published content from the Internet, such as video."), 51; Ex.1001 ¶451.

e. Limitation 19.5

Herzog in view of Ellis discloses this limitation. Ex.1001 ¶514. Herzog's ERP Server connects to the ERP Gen Server over the internet:

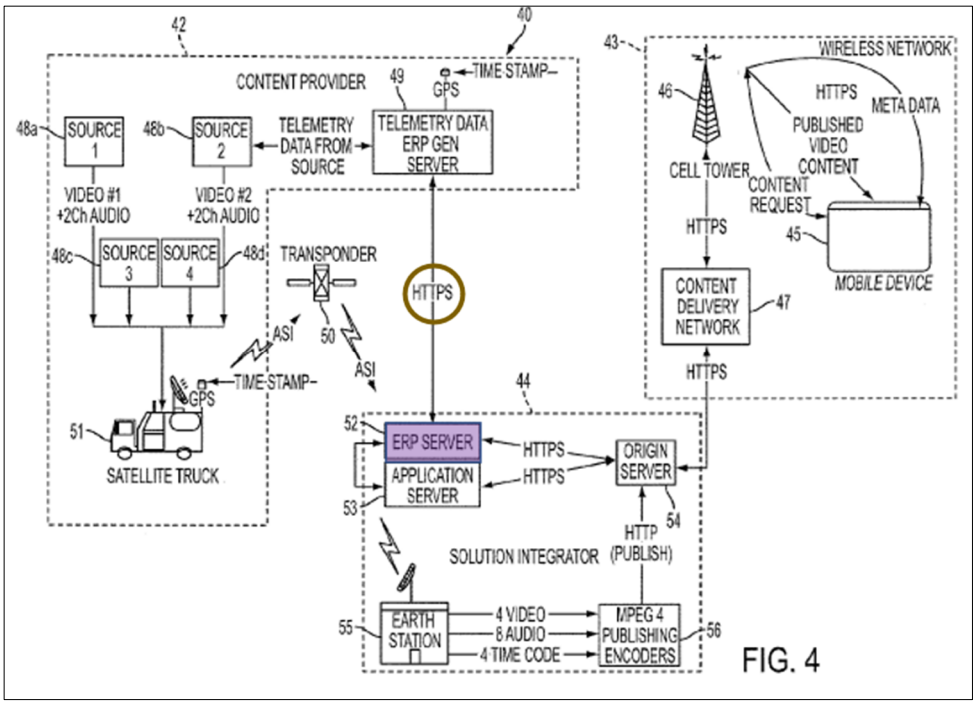


FIG. 4

Ex.1015 ¶¶45, 47, 50, Fig. 4 (annotated). The ERP Server is a generic server that retrieves meta-data from the ERP Gen Server. *Id.* ¶¶16, 47, 50. It contains the same components as the control server: a processor, memory device, and communication interfaces. *Id.* ¶13, 85-86, Fig. 8. The ERP Server "acts as an intermediary between the ERP generator server and the origin server." *Id.* ¶50. The meta-data retrieved includes event information germane to the sporting event such as "the status of each car and driver in the race" and may include "lap number, car speed and acceleration" but there may be as many as "50 different parameters that are available." *Id.*1015 ¶45; Ex.1001 ¶452. The ERP Server retrieves this first event information via the internet and from an event information provider because it retrieves the information, *e.g.*, status of each car and driver in the race, in HTTPS format, an internet communication protocol from an ERP Server. *Id.* ¶¶17, 50; Ex.1001 ¶514.

Additionally, Ellis's SCS can be "any suitable content source configured to provide real-time sports scores and game summary information" including a "content manager, content aggregator, or intermediate content provider." Ex.1001 ¶453; Ex.1016 ¶¶41-42, 142. The SCS periodically retrieves event information germane to all (first/second) live sporting events, *e.g.*, score information because the SCS may "provide real-time sports scores and game summary information, … spread and wagering data, and any other sports-related information to user equipment 102." *Id.* ¶41; *see id.* ¶¶72, 117; Ex.1001 ¶453. A POSA would have understood that this information is retrieved via the internet because that is how real-time data was transferred to users at the time of Herzog, Ellis, and Spivey—including score updates and wagering information. Ex.1001 ¶453; *see* Ex.1016 ¶¶42, 142.

While a periodic time interval is not mentioned in Herzog or Ellis, a POSA would have understood that any system that provides real-time sports statistics, such as Herzog, would necessarily update the statistics on a periodic basis. Ex.1001 ¶454. A POSA would have also understood that HTTP is a pull-oriented protocol where receivers such as the ERP server need to explicitly ask for new data. To reduce latency using an HTTP connection, a POSA would have known to have Herzog's ERP server periodically check for the content availability as often as possible. Ex.1001 ¶724.Alternatively, it would have been an obvious design choice to use a periodic update to limit queries to the system and load on the components. *Id*.

f. Limitation 19.6

Herzog in view of Spivey and Ellis discloses this limitation. Ex.1001 ¶515. Herzog in view of Ellis and Spivey discloses a socket server communicatively coupled to the control server (which, as discussed above, is disclosed by Herzog's ERP Server).

Herzog discloses providing event information over a separate connection to user equipment. Ex.1015 ¶¶48-52, 67, Figs. 4, 6; Ex.1001 ¶456. That process includes the ERP Server transmitting data to the Origin Server:

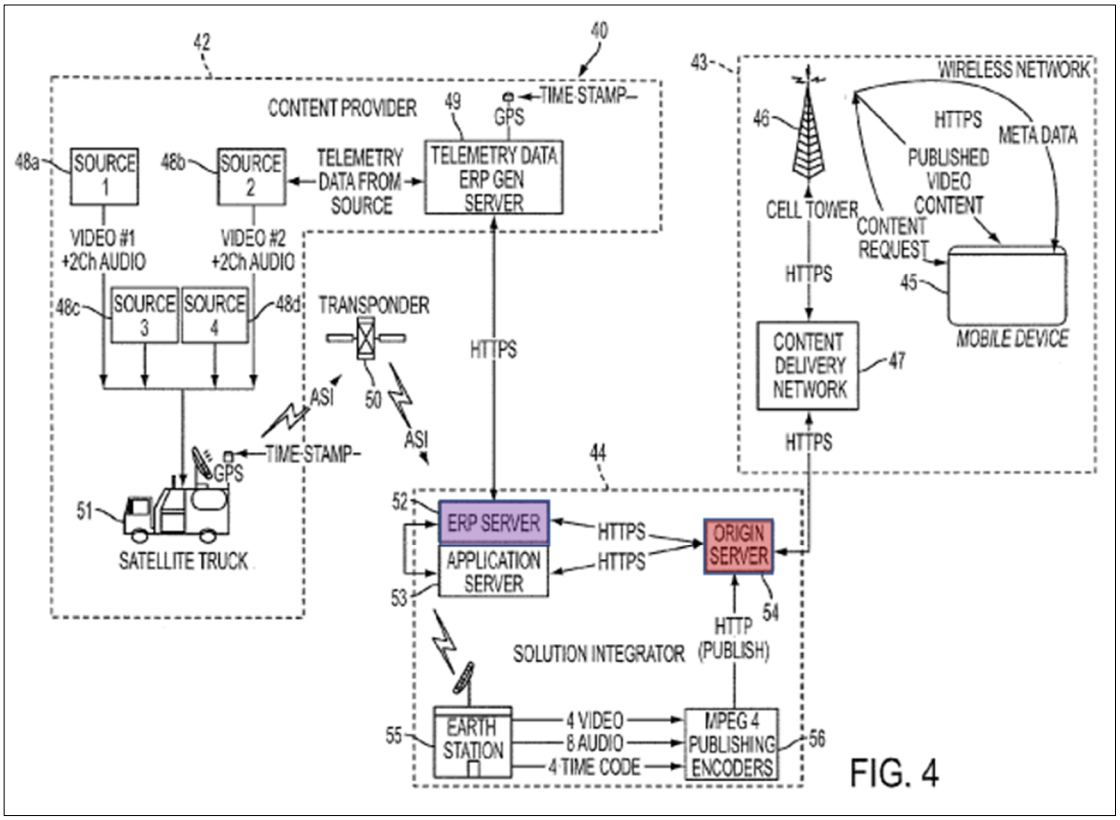


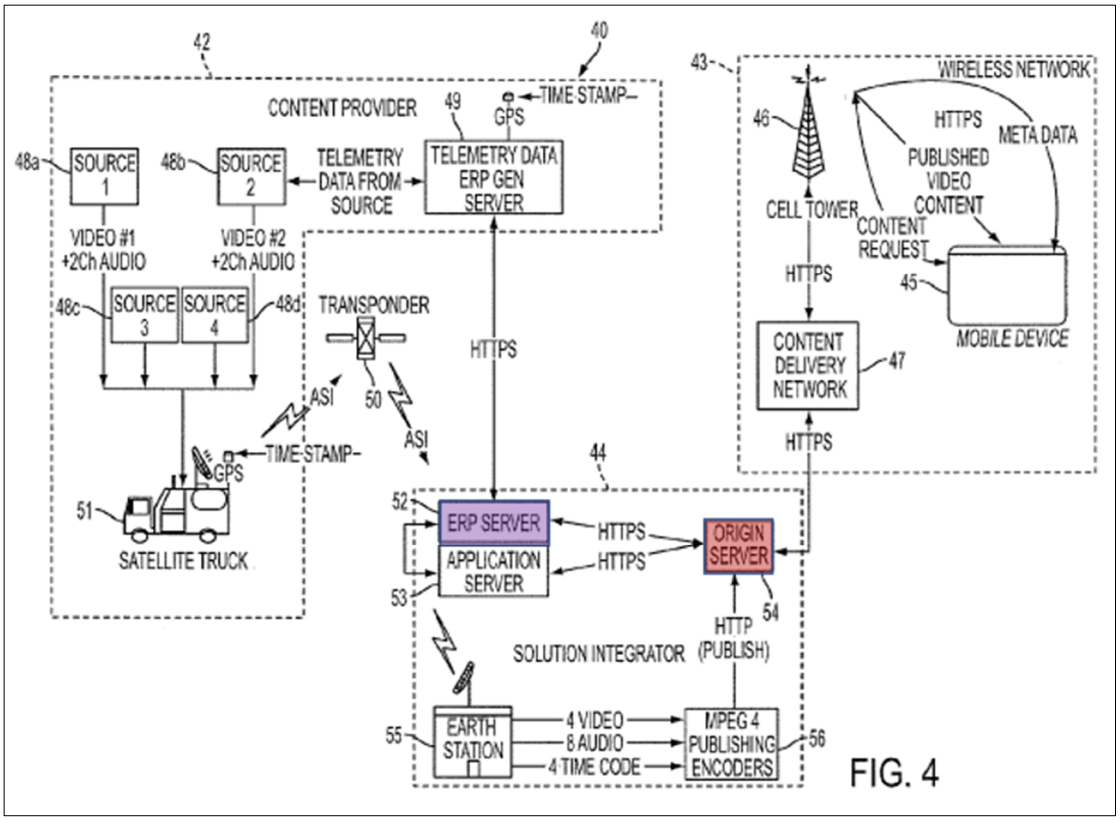
FIG. 4

Ex.1015 ¶¶50-51, Fig. 4 (annotated). As explained above, a POSA would have incorporated Spivey's MQSD into Herzog's Origin Server to reduce latency. Ex.1001 ¶456; §VIII.B.1.

Like the '687's socket server, Spivey's MQSD is a generic server that contains processors, memory, and communication components. Ex.1017 ¶¶35, 53, Figs. 3, 4. Moreover, Spivey's MQSD carries out the same purpose as the '687's socket server. *See* §VIII.A.2.f Thus, a POSA would have understood that Herzog's ERP server transmitting HTTPS information to Spivey's MQSD as disclosing the '687's socket server being communicatively coupled to a control server. Ex.1001 ¶457.

g. Limitation 19.7

Herzog in view of Ellis and Spivey discloses this limitation. Ex.1001 ¶516. Herzog's ERP Server "receives the meta-data from ERP generator server 49 in HTTPS communication format" and "acts as an intermediary between the ERP generator server and the origin server." Ex.1015 ¶50. Figure 4 shows that the meta-data is provided to the origin server from the ERP server in HTTPS format:



Ex.1015 ¶¶50-51, Fig. 4 (annotated). Incorporating Spivey's MQSD into Herzog's origin server would thus allow the MQSD (socket server) to receive from the ERP Server (control server) the meta-data provided (first/second event information). Ex.1001 ¶459. Thus, a POSA would have understood that Herzog in view of Ellis and Spivey discloses a socket server receiving from the control server at least some of the first/second event information. *Id*.

h. Limitation 19.8 and 19.9

Herzog in view of Spivey and Ellis disclose these limitations. Ex.1001 ¶517.

i. First/second event socket corresponding to the first/second event information germane to the first/second live sporting event

A POSA would have understood that Spivey's topic queues disclose the '687's first/second event sockets corresponding to the first/second event information germane to the first/second live sporting event. Ex.1001 ¶¶461-63, 471-72; *see* §VIII.A.2.h.i.

ii. Transmitting the first/second event information to at least the first VCD of the first/second plurality of VCDs

As discussed in Limitations 19.3 and 19.4, Herzog discloses a first VCD of the first/second plurality of VCDs. *See* §VIII.B.2.d, *supra.* Both Herzog and Spivey further disclose transmitting the first/second event information to the first VCD of the first/second plurality of VCDs. For example, in Spivey, the MQSD "may push data from topic queues … to the subscribers of the topics corresponding to those topic queues." Ex.1017 ¶46. In Herzog, the Origin Server may be configured to transmit "the meta-data to the content delivery network 47," which the user receives "in an HTTPS communications protocol." Ex.1015 ¶¶45, 51; Ex.1001, ¶464.

iii. Transmitting via a third/fourth Internet communication channel between at least one first/second event socket of the at least one socket server and the first VCD of the first/second plurality of VCDs

Herzog in view of Ellis and Spivey discloses providing first/second event information over separate internet communication channels. Consistent with, *see* §VIII.A.2.h.iii, Herzog discloses providing event information over a separate

communication path than the video signal where there is "a unique video and meta-data source that do not follow the same path of transmission:"

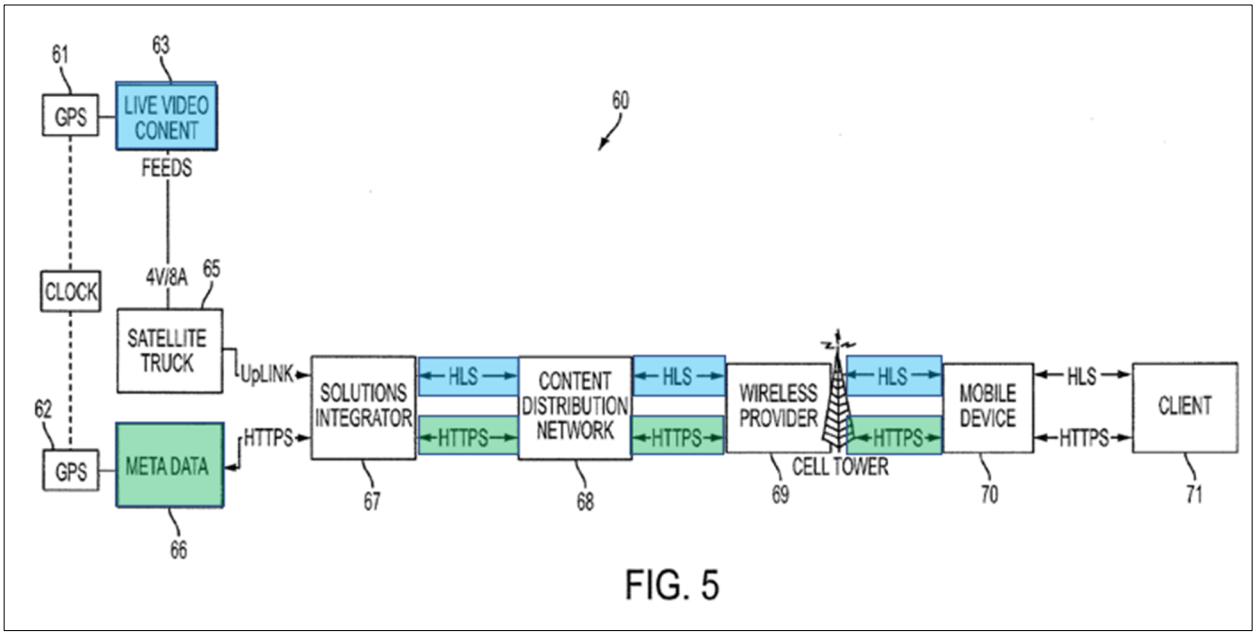


FIG. 5

Ex.1015 ¶¶47-51, 83, Figs. 1, 4, 5 (annotated), 6. Thus, a POSA would have understood Spivey to disclose transmitting first/second event information via separate (third/fourth) internet connections. Ex.1001 ¶466.

Further, for the same reasons describe above, *see* §VIII.A.2.h.iii, a POSA would have understood that Herzog in view of Ellis and Spivey discloses distributing first/second event information from a first/second event socket to a first/second user device over separate Internet communication channels using a URL and text string. Ex.1001 ¶467.

3. Dependent Claim 20

a. Limitations 20.0-20.1

See Claim 19. §VIII.B.2, *supra.*

b. Limitations 20.2-20.3

Herzog in view of Ellis discloses these limitations for the same reasons as discussed in section VIII.B.2.d, *supra.* Specifically, Herzog in view of Ellis discloses providing individual copies, to multiple different users, of multiple different live streams of digital content, related to different live sporting events, over individual "video" internet connections. §§VIII.B.2.d, *supra*; Ex.1001 ¶479.

c. Limitations 20.4

See Limitation 19.6. §VIII.B.2.f, *supra.*

d. Limitations 20.5-20.6

Herzog in view of Ellis and Spivey discloses these limitations. Ex.1001 ¶518. These limitations are substantially the same as limitations 19.8 and 19.9. §VIII.B.2.h. These limitations simply add transmitting the first/second event information, to a second VCD, of the same first/second plurality of VCDs.

Herzog in view of Ellis and Spivey further disclose transmitting the first/second event information to the second VCD of the previously mentioned first/second plurality of VCDs over an individual third/fourth event Internet communication channels. For example, in Spivey, the MQSD "may push data from topic queues … to the subscribers of the topics corresponding to those topic queues." Ex.1017 ¶46. In Ellis, SCS may be configured "to provide real-time sports scores and game summary information, … to user equipment 102." Ex.1016 ¶41; *see id.* ¶39 ("Any suitable number of users may have one or more user equipment … 102.").

Moreover, in Herzog, the meta-data is provided "to users/consumers of the content." Ex.1015 ¶¶49, 51; *see id.* ¶74 (users receive the meta-data "associated with … a particular video channel"). Thus, a POSA would have understood that Herzog, in view of Spivey and Ellis, discloses these limitations because all three disclose transmitting the first/second event information to multiple VCDs of the first/second plurality of VCDs over separate internet connections. Ex.1001 ¶518.

4. Dependent Claim 21

a. Limitations 21.0-21.2

See Claim 19. §VIII.B.2.

Herzog in view of Ellis and Spivey discloses transmitting information via individual communication channels between a socket and a first VCD of a first/second plurality of VCDs who are watching different live events event. §§VIII.B.2.h, VIII.B.3.d, *supra*.

Ellis discloses sending and receiving chat information because users "may also leave feedback regarding the commentary that other users in the media system may view when they access the same commentary." Ex.1016 ¶132. Thus, a POSA would have understood that Herzog in view of Ellis and Spivey discloses a system that transmits and receives first/second chat information regarding the first/second live stream of digital content. Ex.1001 ¶519; *see also* Ex.1016 ¶126.

Ellis, consistent with Herzog's separate meta-data stream, also discloses providing this event data and chat information on a separate channel to users.

Ex.1001 ¶487; Ex.1015 ¶¶49-53, 59-61, Fig. 5; Ex.1016 ¶¶39-41, Fig. 1. Ellis discusses transmitting the video "broadcasts" over communication path 150 and "game summary information, … and any other sports-related information" over communication path 152. Ex.1016 ¶41. Consistent with Herzog, Ellis provides that in "some embodiments, this sports-related information is provided to user equipment 102 as a plurality of real-time data feeds." Ex.1016 ¶41; Ex.1001 ¶487. Thus, a POSA would have understood that Herzog in view Ellis of Spivey discloses transmitting via at least one first/second chat/system event Internet communication channel between at least one first/second chat/system event socket of the at least one socket server and the first VCD of the first/second plurality of VCDs. Ex.1001 ¶519.

Herzog in view of Ellis and Spivey discloses a socket specifically designated for chat information. Ex.1001 ¶488. Spivey, for example, discloses a first/second chat/system event socket corresponding to the first/second chat information. *See* §§VIII.A.4.a, VIII.B.2.h, *supra*. Thus, a POSA would have understood Spivey to disclose a first/second chat/system event socket corresponding to the first/second chat information. Ex.1001 ¶488.

5. Dependent Claim 22

a. Limitation 22.0

See Claim 21. §VIII.B.4, *supra*.

b. Limitations 22.1-22.5, 22.7

Herzog in view of Ellis and Spivey renders these limitations obvious for the same reasons stated above. §§VIII.A.5.b, VIII.B.3, *supra*.

c. Limitations 22.6 and 22.8

Herzog in view of Ellis and Spivey renders these limitations obvious. Ex.1001 ¶¶522-23. These limitations are substantially the same as limitations 21.1 and 21.2. Ex.1003, Claim 21. But these limitations further require that the first/second chat information is sent to a second VCD of the first/second plurality of VCDs. *Id.* This is disclosed for the same reasons that event information being transmitted to a second VCD is disclosed in limitations 22.5 and 22.7. Also, the slight difference in word choice, *e.g.*, "first live sporting event video-based commentary" versus "first live stream of digital content," does not change the meaning of the claim, as this claim depends on claim 21, and the first/second chat information is already defined therein. Ex.1001 ¶523. Thus, a POSA would have understood that Herzog in view of Ellis and Spivey discloses these limitations for the same reasons as stated above. §VIII.B.4.a, *supra*.

6. Independent Claim 23

a. Limitation 23.0

Herzog in view of Ellis and Spivey renders this limitation obvious. Ex.1001 ¶524. This limitation is substantially the same as limitation 19.0. Claim 23 is a method claim implementing the system of Claim 19. *Id*. Thus, a POSA would have

understood that Herzog in view of Ellis and Spivey discloses this limitation for the same reasons stated above. §VIII.B.2.a, *supra*; Ex.1001 ¶524.

b. Limitation 23.1

Herzog in view of Ellis and Spivey renders this limitation obvious for the same reasons stated above. §§VIII.B.2.b-d, *supra*; Ex.1001 ¶525.

c. Limitation 23.2

Herzog in view of Ellis and Spivey renders this limitation obvious for the same reasons stated above. §VIII.B.2.e, *supra*; Ex.1001 ¶526.

d. Limitation 23.3

This limitation is substantially the same as limitation 19.8. Ex.1001 ¶527. The claim language is slightly altered, but the claims contain the same elements. *Id*. Thus, a POSA would have understood that Herzog in view of Ellis and Spivey discloses this limitation for the same reasons stated above. §§VIII.B.2.f-h, *supra*; Ex.1001 ¶527.

7. Dependent Claim 24

a. Limitation 24.0

See Claim 23. §VIII.B.6, *supra*.

b. Limitation 24.1

Herzog in view of Ellis and Spivey renders this limitation obvious for the same reasons stated above. §§VIII.A.7.b, VIII.B.4, *supra*; Ex.1001 ¶529.

8. Dependent Claim 25

a. Limitation 25.0

See Claim 23. §VIII.B.6, *supra*.

b. Limitation 25.1

Herzog discloses this limitation. Ex.1001 ¶531. Herzog discloses a control server (ERP Server) periodically retrieving real-time information from the event information provider (ERP Gen Server) that includes event information over the internet. *See* Ex.1015 ¶¶48-50; *see also*, Ex.1017 ¶48 (score, play, error, and at-bat updates); §§VIII.B.2.e, *supra*; Ex.1001 ¶531. The only remaining portion of this limitation is that the system needs to "update the first event information."

Herzog in view of Spivey and Ellis discloses this. Ex.1001 ¶532. Herzog and Spivey both disclose a memory system, including a database, communicatively coupled to the ERP server (control server). Ex.1001. ¶532. Herzog explains that first the meta-data (event information) is "sent to the ERP server." Ex.1015 ¶67. Second, the client requests and "receives the HLS video." Ex.1015 ¶73. Third, a "user initiates a request for meta-data that is associated with the VITC time stamp of a particular video channel on the display of the video player." *Id.* ¶74. Only then, does Herzog's ERP Server in response to the "request for meta-data" "transmit[] the meta-data with a corresponding .JSON time stamp of the live event." *Id.* ¶¶74-76. Thus, Herzog's ERP Server updates the meta-data in its database and stores it until a user requests the data. Ex., 1001 ¶532; *see* Ex.1015 ¶¶67-77.

c. Limitation 25.2

Herzog in view of Ellis and Spivey discloses this limitation. Ex.1001 ¶¶533-34. A POSA would have understood that this limitation requires that for each first event information update at the control server, the control server readies a delayed message including the first event information, that will be processed and sent to the socket server's first event socket in turn. *Id.* ¶533.

In the same way, Herzog's ERP Server delays updates to the Origin (socket) server. Ex.1001 ¶534. For example, the ERP Server receives all the meta-data from the ERP generator server. *See* Ex.1015 ¶50. The ERP Server cannot stream all the retrieved data to the origin server, however, because some of the meta-data is sensitive competition data, *e.g.*, tire pressure. *Id.*; Ex.1001 ¶509 (comparing this information to advanced analytics). Thus, the ERP Server must first "filter and eliminate contents of meta-data." *Id.* Only afterwards, can the ERP Server provide the delayed information update to the origin server, *i.e.*, the socket server. *Id.* Thus, a POSA would have understood that this meta-data (event information) update is an asynchronous message that includes the updated meta-data that is transmitted to the origin server (first event socket). Ex.1001 ¶534.

9. Independent Claim 27

a. Limitation 27.0

See Limitation 19.0. §VIII.B.2.a, *supra.*

b. Limitation 27.1

See Limitations 19.1-19.4. §§VIII.B.2.b-d, *supra*. Herzog also discloses an algorithm for providing a first copy to a first VCD a first live stream of digital content relating to a first live sporting event. Ex.1015, ¶¶69-73; Ex.1001, ¶536.

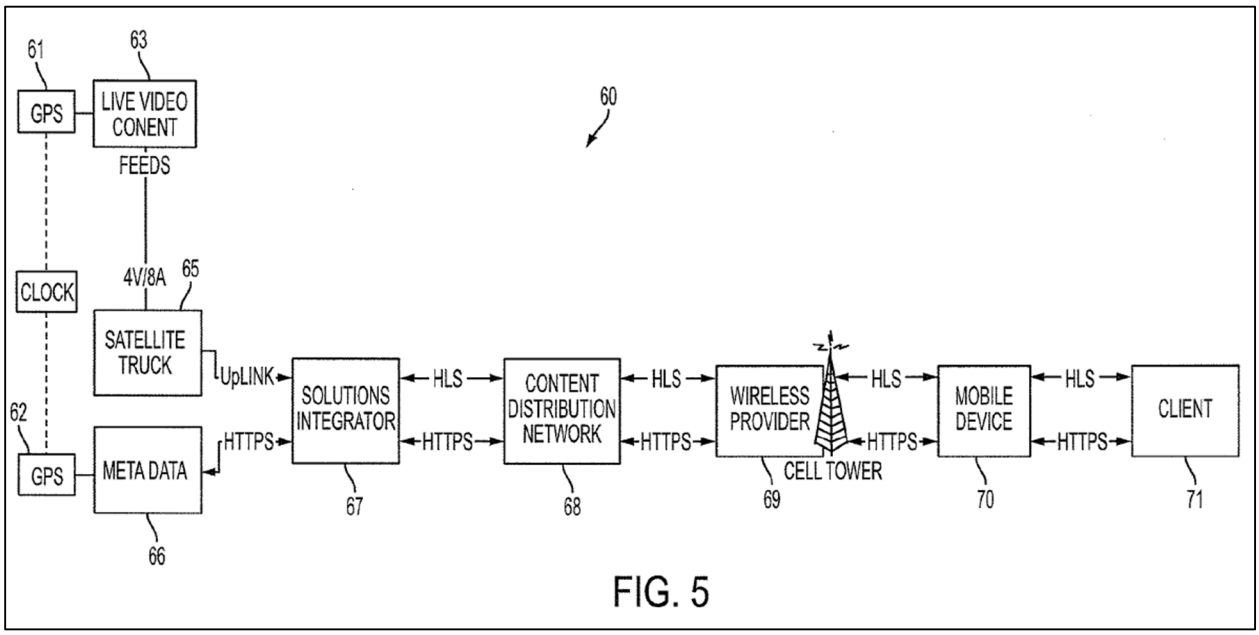


FIG. 5

Ex.1015, Fig. 5; Ex.1001, ¶536.

c. Limitations 27.2 and 27.3

See Limitations 19.5-19.9. §§VIII.B.2.e-h, *supra*. Herzog in view of Ellis and Spivey also discloses an algorithm for retrieving and transmitting to a first VCD, via the Internet and a first event information communication channel different than a video communication channel, first event information germane to a first live sporting event. Ex.1015, ¶¶69-77, Fig. 5; Ex.1017, Figs. 12-13; Ex.1016, Figs. 30, 32; Ex.1001, ¶537.

10. Dependent Claim 28

a. Limitation 28.0

See Claim 27. §VIII.B.9, *supra*.

b. Limitation 28.1

See Claim 21. §VIII.B.4, *supra*. Herzog in view of Ellis discloses an algorithm where the chat/system Internet communication channel is different from the video communication channel and the first event information channel. *See* Ex.1015, ¶¶69-77, Fig. 5; Ex.1017, Figs. 12-13; Ex.1016, Figs. 30, 32; Ex.1001, ¶539.

11. Dependent Claim 29

a. Limitation 29.0

See Claims 25, 27. §§VIII.B.8, VIII.B.9, *supra.*

12. Dependent Claim 30

a. Limitation 30.0

See Claim 27. §VIII.B.9, *supra.*

b. Limitation 30.1

Herzog discloses this limitation. Ex.1001 ¶542. First, Herzog discloses an HLS file suite representing the first live stream of digital content because it streams the live event's "video/audio stream" using HLS. Ex.1015 ¶¶51, 55. Second, Herzog discloses a mother server because the system contemplates publishing the video streams from the Encoders, in HLS format, to the content delivery network 47 (mother server), which can be a "server" "implemented using one or more hardware

platforms intended to represent a general class of data processing device … with an appropriate network connection." Ex.1015 ¶¶49-51, 83; Ex.1001 ¶542. Thus, a POSA would have understood that Herzog's content delivery contains an HLS mother server that is revieing a first HLS file suite that represents the first live stream of digital content. Ex.1001 ¶542.

c. Limitation 30.2

Herzog discloses a generic server and system that streams copies of an HLS file suite to user devices over a communication channel between the CDN and user device. §§VIII.B.2, VIII.B.12.b, *supra.* Moreover, Herzog discloses transferring these HLS streams to "other servers that are physically located closer to end users requesting the data in a network communication system," *i.e.*, child server. Ex.1015 ¶51; Ex.1001 ¶543. Further, Herzog discloses an entire "content delivery network" that "broadcast[s]" sporting events. Ex.1015 ¶¶43, 83. Necessarily, such a system would utilize a conventional CDN, as recognized in the '687. Ex.1001 ¶543; Ex.1003, 39:60-40:10. Thus, a POSA would have understood Herzog discloses this limitation. *Id.* ¶543.

IX. SECONDARY CONSIDERATIONS OF NON-OBVIOUSNESS

Petitioner is unaware of any evidence of secondary considerations that have a nexus to the claimed inventions that would overcome the Petition's showing of obviousness. Ex.1001 ¶768. Indeed, the sheer number of "[i]ndependently made,

simultaneous inventions, made within a comparatively short space of time, are persuasive" "indicia of obviousness." *Geo. M. Martin v. Alliance Machine*, 618 F.3d 1294, 1304-05 (Fed. Cir. 2010) (quotations omitted).

X. THE BOARD SHOULD NOT EXERCISE DISCRETIONARY DENIAL

A. The '687 Has Not Been Subject to a Prior Petition by the Current Petitioner

Furthermore, there is no "significant relationship" between the prior Petitioner (Genius) and the present Petitioner (Sportradar). *Videndum Production Solutions, Inc. v. Rotolight Limited*, IPR2023-01218, Paper 12 (April 19, 2024). *See also*, *supra* at 1; Petitioner's *Reasons for Parallel Petitions and Petition Ranking* filed concurrently herewith.

B. *Fintiv*

Petitioner has stipulated to PO that if this IPR is instituted, Petitioner will not pursue invalidity on the grounds raised here or on any other ground that reasonably could have been raised in this IPR. Ex.1021. Thus, the Board should not exercise discretionary denial. Ex.1013.

XI. CONCLUSION

For the foregoing reasons, Petitioner respectfully requests that the Board institute IPR and cancel the Challenged Claims.

Date: December 11, 2024

Respectfully submitted,

/Scott W. Cummings/

Scott W. Cummings
Reg. No. 41,567
BRYAN CAVE LEIGHTON PAISNER LLP
scott.cummings@bclplaw.com

Alexander Walden
pro hac vice motion to follow
BRYAN CAVE LEIGHTON PAISNER LLP
alexander.walden@bclplaw.com

Frank Fabiani
Reg. No. 75,934
BRYAN CAVE LEIGHTON PAISNER LLP
frank.fabiani@bclplaw.com

Attorneys For Petitioner Sportradar AG

CERTIFICATE OF COMPLIANCE

This Petition complies with the type-volume limitations as mandated in 37 C.F.R. §42.24. According to the word processing system used to prepare this document, the brief contains 13,912 (14,000 limit) words.

December 11, 2024

/Scott W. Cummings/

Scott W. Cummings
Reg. No. 41,567
BRYAN CAVE LEIGHTON PAISNER LLP
scott.cummings@bclplaw.com

CERTIFICATE OF SERVICE

In compliance with 37 C.F.R. §§42.105, 42.6(e), the undersigned hereby certifies that a copy of the foregoing Petition, supporting exhibits, and Power of Attorney were served on the 11th day of December, 2024, via Federal Express® directed to PO at the correspondence address of record:

149890 - Smith Baluch LLP
376 Boylston St,
Suite 401
Boston, MA 02116

A courtesy copy was also served by electronic mail on PO's counsel of record in the Texas litigation:

Britton F. Davis
KING & SPALDING LLP
1401 Lawrence Street
Suite 1900
Denver, CO 80202
(720) 535-2300
bfdavis@kslaw.com

Christopher C. Campbell
KING & SPALDING LLP
1700 Pennsylvania Avenue, NW
Suite 200
Washington, DC 20006
(202) 626-5578
ccampbell@kslaw.com

Ryan A. Schmid
KING & SPALDING LLP
1700 Pennsylvania Avenue, NW
Suite 200
Washington, DC 20006
(202) 626-5578
rschmid@kslaw.com

Matthew D. Wood
KING & SPALDING LLP
500 West 2nd Street
Suite 1800
Austin, TX 78701
(512) 457-2000
mwood@kslaw.com

/Teresa C. Rodriguez/

TABLE OF EXHIBITS[8]

Exhibit No.	Description
Exhibit 1001	Declaration of Dr. Omid Kia, Ph.D.
Exhibit 1002	*Curriculum Vitae* of Dr. Omid Kia, Ph.D.
Exhibit 1003	U.S. Patent No. 10,805,687
Exhibit 1004	Claim Listing of U.S. Patent No. 10,805,687
Exhibit 1005	Certified File History of U.S. Patent No. 10,805,687
Exhibit 1006	U.S. Patent No. 10,425,697
Exhibit 1007	Claim Listing of U.S. Patent No. 10,425,697
Exhibit 1008	Reserved
Exhibit 1009	U.S. Patent No. 11,039,218
Exhibit 1010	Claim Listing of U.S. Patent No. 11,039,218
Exhibit 1011	Reserved
Exhibit 1012	U.S. Patent No. 11,871,088
Exhibit 1013	Director Vidal Memorandum re: *Sotera* Stipulations
Exhibit 1014	SportsCastr's Complaint for Patent Infringement against Genius Sports
Exhibit 1015	U.S. Patent Pub. No. 2015/0163379 ("Herzog")

[8] Unless otherwise specified, citations are to the original page, column, and line numbers in exhibits. Brackets ([]) are used to refer to the sequential page numbers added to exhibits pursuant to 37 C.F.R. §42.63(d)(2)(i).

Exhibit 1016	U.S. Patent Pub. No. 2014/0229992 ("Ellis")
Exhibit 1017	U.S. Patent Pub. No. 2016/0036910 ("Spivey")
Exhibit 1018	U.S. Patent Pub. No. 2015/0163379 ("Mitic")
Exhibit 1019	SportsCastr's Preliminary Infringement Contentions
Exhibit 1020	SportsCastr's Response to Genius Sports' First Set of Interrogatories
Exhibit 1021	Sportradar's proposed *Sotera* Stipulation to SportsCastr
Exhibit 1022	James F. Kurose & Keith W. Ross, *Application Layer*, in Computer Networking A Top-Down Approach (Michael Hirsch et al. eds., 4th ed. 2012) ("Kurose")
Exhibit 1023	John Dilley et al., *Globally Distributed Content Delivery*, IEEE Internet Computing (Sept.–Oct. 2002).
Exhibit 1024	Mário Marques da Silva, Multimedia Communications and Networking (2012) ("Silva")
Exhibit 1025	*A Brief History of the Internet*, ONLINE LIB. LEARNING CENTER. (Feb. 9, 2024), https://www.usg.edu/galileo/skills/unit07/internet07_02.phtml ("Online Library")
Exhibit 1026	Hisayuuki Ohmata et al., *Hybridcast: A new media experience by integration of broadcasting and broadband*, 2013 ITU Kaleidoscope: Building Sustainable Communities, April 2013 ("Ohmata")
Exhibit 1027	Henning Schulzrinne et al., *RTP: A Transport Protocol for Real-Time-Applications*, DataTracker (January 1996), https://datatracker.ietf.org/doc/html/rfc1889 ("Schulzrinne")
Exhibit 1028	Brijesh Kumar, *Making Sense of Video Streaming Protocols*, LinkedIn. (Aug. 11, 2016), https://www.linkedin.com/pulse/making-sense-video-streaming-protocols-dr-brijesh-kumar/ ("Kumar")

Exhibit 1029	Ian Fette & Alexey Melnikov, *The WebSocket Protocol*, RFC Editor. (Dec. 2016), https://www.rfc-editor.org/rfc/rfc6455.html.
Exhibit 1030	Marcin Warczygłowa, *Real-time Web Application with Websockets and Vert.X* (Nov. 10, 2015), https://blog.allegro.tech/2015/11/real-time-web-application-with-websockets-and-vert-x.html.
Exhibit 1031	Randall Stewart & Chris Metz, *SCTP: new transport protocol for TCP/IP*, 5 IEEE 64, (2001) ("Stewart")
Exhibit 1032	Lydon Ong, John Yoakum &, *An Introduction to the Stream Control Transmission Protocol (SCTP)*, Datatracker. (May. 2002), https://datatracker.ietf.org/doc/rfc3286/ ("Ong")
Exhibit 1033	Jan Newmarch, *Introduction to Stream Control Transmission Protocol*, LINUX J. (Sep. 1, 2007), https://www.linuxjournal.com/article/9748 ("Newmarch")
Exhibit 1034	Kyung-Hoe Kim et al, *A transmission control SCTP for real-time multimedia streaming*, 54 Computer Networks 1418, (2010) ("Kim")
Exhibit 1035	High Scalability, *How Facebook Live Streams to 800,000 Simultaneous Viewers*, ByteByteGo (Jun. 27, 2016), https://blog.bytebytego.com/?utm_source=hs&utm_medium=ann&utm_campaign=top ("ByteGo")
Exhibit 1036	Hardeep Singh Parmar & Michael C. Thornburgh, *Adobe's Real Time Messaging Protocol*, Veriskope. (Dec. 21, 2002) ("Parmer")
Exhibit 1037	Ilya Grigorik, *WebRTC*, in High Performance Browser Networking, (2013) ("Grigorik")
Exhibit 1038	Sam Dutton, *Get started with WebRTC*, web.dev. (Jul. 23, 2012), https://web.dev/articles/webrtc-basics ("Dutton")
Exhibit 1039	Andy Salo, *MPEG DASH: A Technical Deep Dive and Look at What's Next*, RGB Networks, (2012) ("Salo")

Exhibit 1040	Jan Ozer, *Upstream, Justin.tv, Livestream, and Bambuser: Streaming Unplugged*, Streaming Media Magazine., Jun.–Jul. 2012 ("Ozer")
Exhibit 1041	Christopher Mueller, *MEPG-DASH vs. Apple HLS vs. Microsoft Smooth Streaming vs. Adobe HDS*, BITMOVIN. (Mar. 29, 2015), https://bitmovin.com/mpeg-dash-vs-apple-hls-vs-microsoft-smooth-streaming-vs-adobe-hds/ ("Mueller")
Exhibit 1042	Stefan Saroiu et al., *An analysis of Internet Content Delivery Systems*, ACM SIGOPS Operating System Review, Vol. 36 (Dec. 31, 2002), https://doi.org/10.1145/844128.84415 ("Saroiu")
Exhibit 1043	Charles Marion & Julien Jomier, *Real-time Collaborative Scientific WebGL Visualization with Websocket*, Ass'n Computing Machinery, August 4-5, 2012 ("Marion")
Exhibit 1044	Mark Sweney, *First ads appear on YouTube Clips*, Guardian, Aug. 22, 2007 ("Sweney")
Exhibit 1045	Richard Sandomir, *The Innovation That Grew and Grew*, N.Y. Times, June 12, 2014 ("Sandomir")
Exhibit 1046	Victoria Pimentel & Bradford G. Nickerson, *Communicating and Displaying Real-Time Data with WebSocket*, 16 IEEE (2012) ("Pimentel")
Exhibit 1047	Lucian Popa et al., *HTTP as the narrow waist of the future internet*, 2010 ACM SIGCOMM Workshop, October 2013 ("Popa")
Exhibit 1048	Declaration of Dr. Stephen Wicker, Ph.D., dated August 22, 2024 (submitted in support of the IPR petitions in IPR2024-01305, IPR2024-01307, IPR2024-01308, IPR2024-01309, IPR2024-01310, and IPR2024-01311) ("Wicker Declaration")
Exhibit 1049	Comparison of the Declaration of Dr. Omid Kia, Ph.D. (Ex. 1) to the Wicker Declaration (Ex. 1048)