

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Google LLC,
Petitioner,

v.

Withrow Networks Inc.,
Patent Owner.

Case No. IPR2025-00775
U.S. Patent No. 10771849

DECLARATION OF MATTHEW GOLDMAN

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EXHIBIT LIST

Exhibit No.	Description
2001	<i>Withrow Networks, Inc. v. Google, LLC and YouTube, LLC</i> , No. 5:24-cv-03203-PCP (NDCA), Complaint file May 24, 2024 (D.I. 1) (“Complaint”)
2002	<i>Withrow Networks, Inc. v. Google, LLC and YouTube, LLC</i> , No. 5:24-cv-03203-PCP (NDCA), Order Denying Motion to Dismiss dated January 21, 2025 (D.I. 44) (“Order Denying Motion to Dismiss”)
2003	<i>Withrow Networks, Inc. v. Google, LLC and YouTube, LLC</i> , No. 5:24-cv-03203-PCP (NDCA), Answer filed February 4, 2025 (D.I. 48) (“Answer”)
2004	<i>Withrow Networks, Inc. v. Google, LLC and YouTube, LLC</i> , No. 5:24-cv-03203-PCP (NDCA), the parties’ Joint Case Management Statement dated February 7, 2025 (D.I. 48) (“Joint Case Management Statement”)
2005	<i>Withrow Networks, Inc. v. Google, LLC and YouTube, LLC</i> , No. 5:24-cv-03203-PCP (NDCA), Motion to Stay Case Pending the Resolution of Petition for <i>Inter Partes</i> Review dated March 25, 2025 (D.I. 60) (“Motion to Stay”)
2006	<i>Withrow Networks, Inc. v. Google, LLC and YouTube, LLC</i> , No. 5:24-cv-03203-PCP (NDCA), Opposition to Motion to Stay dated April 8, 2025 (D.I. 63) (“Opposition to Motion to Stay”)
2007	<i>Withrow Networks, Inc. v. Google, LLC and YouTube, LLC</i> , No. 5:24-cv-03203-PCP (NDCA), Reply Re Motion to Stay Case Pending the Resolution of Petition for <i>Inter Partes</i> Review dated April 15, 2025 (D.I. 70) (“Reply re Motion to Stay”)
2008	<i>Withrow Networks, Inc. v. Google, LLC and YouTube, LLC</i> , No. 5:24-cv-03203-PCP (NDCA), Stipulation and Order re Electronically Stored Information dated March 24, 2025 (D.I. 59) (“ESI Order”)

Exhibit No.	Description
2009	<i>Withrow Networks, Inc. v. Google, LLC and YouTube, LLC</i> , No. 5:24-cv-03203-PCP (NDCA), Order re Dispute re Proposed Protective Order dated March 28, 2025 (“Order on Discovery Letter Brief”)
2010	<i>Withrow Networks, Inc. v. Google, LLC and YouTube, LLC</i> , No. 5:24-cv-03203-PCP (NDCA), Stipulated Protective Order dated April 10, 2025 (“SPO”)
2011	Judge P. Casey Pitts Standing Order for Civil Cases (Aug. 2024)
2012	Exhibit 0 to Invalidity Contentions Served in NDCA Litigation
2013	<i>Withrow Networks, Inc. v. Google, LLC and YouTube, LLC</i> , No. 5:24-cv-03203-PCP (NDCA), The Parties’ Joint Claim Construction and Prehearing Statement dated June 23, 2025 (D.I. 92, 92-1) (“JCCPS”)
2014	Declaration of Matthew Goldman
2015	December 17, 2025 Deposition Transcript of Nathaniel Polish, Ph. D.
2016	CV of Matthew Goldman
2017	Printout of movy.tv website from Internet Archive
2018	Christian Pillsbury, “Gone in a Flash: a brief history of HTTP Adaptive Streaming”, MUX, October 10, 2022, <i>available at</i> Gone in a Flash: a brief history of HTTP Adaptive Streaming Mux (last accessed January 18, 2026)
2019	Video titled “Movidity mymovy.com streaming video on BlackBerry 8700”, <i>Available at</i> https://youtu.be/zN34b_MJKH8 (last accessed January 18, 2026)
2020	Press release titled “Movidity Demonstrated at JavaOne Conference,” May 12, 2006.
2021	“Apple’s First iPhone: How It Looked and What It Could Do,” T-Mobile, October 14, 2025, <i>available at</i> Apple's First iPhone: How It Looked And What It Could Do T-Mobile (last accessed January 18, 2026)

Exhibit No.	Description
2022	Printout of Garth Johnston, “ABC.com Unveils ‘HD’ Video Player,” Broadcasting & Cable, April 2, 2007 from Internet Archive.
2023	[reserved]
2024	Pickle, Brian. “Buffer Definition.” TechTerms.com. (December 28, 2023). Accessed Jan 18, 2026. https://techterms.com/definition/buffer
2025	“Stateful vs Stateless Architecture,” Geeks for Geeks (September 19, 2025), <i>available at</i> Stateful vs. Stateless Architecture - GeeksforGeeks ; <i>last accessed</i> January 19, 2026.
2026	Patent Appl. Pub. No. US 2009/0254657 (“Melnik”)
2027	Ricardo R. Pastrana-Vidal et al., “Sporadic Frame Dropping Impact on Quality Perception,” Human Vision and Electronic Imaging IX, The International Society for Optical Engineering, Vol. 5292, June 2004.
2028	Giuliano Casale et al., “Performance Issues in Video Streaming Environments.” 2005 Workshop on Techniques, Methodologies and Tools for Performance Evaluation of Complex Systems (FIRB-PERF’05), 2005.
2029	J. Welch et al., “A Proposed Media Delivery Index,” IEEE Network Working Group Internal Draft (August 2005).
2030	Tom Gerstel, “Streams and Standards Delivering Mobile Video,” ACM Queue, May 2005.
2031	Chang-Wen Chen & Houqiang Li, Video Streaming to Mobile Handheld Devices: Challenges in Decoding, Adaptation, and Browsing, in Proc. EX2031 IEEE Int’l Conf. on Multimedia & Expo 68, 68–75 (2007).
2032	Sean Michael Kerner et al., “3G (third generation of mobile telephony)”, Techtarget (April 2, 2021), <i>available at</i> www.techtarget.com/searchnetworking/definition/3G-third-generation-of-mobile-telephony ; <i>last accessed</i> January 23, 2026.

I, Matthew Goldman, do hereby declare as follows:

I. INTRODUCTION

1. I am over the age of 18 and am competent to write this Declaration.
2. I make this declaration based upon my own personal knowledge and, if called upon to testify, would testify competently to the matters stated herein.
3. I have been asked to provide my expert opinion in connection with the above-referenced inter partes review proceeding in the United States Patent and Trademark Office for U.S. Patent Nos. 10,771,849 (“the ’849 patent”) and prior art references relating to its subject matter. I have personal knowledge or have developed knowledge of these technologies based upon my education, training, or experience as set forth below.
4. My opinions are based on my years of education, research, and experience, as well as my investigation and study of relevant materials. I may rely upon these materials, my knowledge and experience, and/or additional materials in providing my analysis or opinions for these proceedings. Further, I may also consider additional documents and information in forming any necessary opinions, including documents that may not yet have been provided to me. This declaration represents only those opinions I have formed to date. I reserve the right to revise, supplement, and/or amend my opinions stated herein based on new information and on my continuing analysis of the materials submitted in these proceedings.

5. This declaration is a statement of my opinions on issues relating to the patentability of claims 1–9 of the '849 patent (“the Challenged Claims”). As I explain more fully below, it is my opinion that the Challenged Claims are patentable over the prior art challenges advanced in the Petition.

II. BACKGROUND AND QUALIFICATIONS

6. I am an expert in the field of networking and communications, multimedia processing, and multimedia transport. I have studied and practiced electrical engineering for over forty (40) years, with thirty-three (33) years of direct experience in multimedia video streaming and broadcasting. I have summarized in this section my educational background, work experience, and other relevant qualifications. Attached hereto as Exhibit 2016 is a true and correct copy of my curriculum vitae describing my background and experience.

7. I earned my Bachelor of Science degree in Electrical Engineering with High Honors from Worcester Polytechnic Institute (WPI) in Worcester, MA in 1983. After earning my degree, I worked with the Raytheon Company as a design engineer where I was responsible for designing a CPU-based error detection and correction memory controller. I then returned to WPI where I earned my Master of Science degree in Electrical Engineering in 1988.

8. During and following earning my M.S.E.E., I worked with various product development groups in Massachusetts, within Digital Equipment

Corporation, where I helped design computer systems including the *VAX 9000* mainframe computer and a gallium arsenide version of the *Alpha AXP* microprocessor chip. During my time working with Digital Equipment Corporation, I also codeveloped an interactive multimedia server system, created a flow control protocol for video delivery, and was responsible for end-to-end systems design in the area of network interfaces, control protocols, and digitized compressed video (e.g., the Moving Picture Experts Group (“MPEG”) standards).

9. While working with Digital Equipment Corporation, I was also a major contributor to the development of several key foundation standards in the TV industry, including the MPEG-2 Systems Standard for video transport and streaming systems which were the predecessors to the MPEG-4 system discussed at length in the ‘849 Patent. In 1996, I accepted employment with DiviCom where I continued to develop system solutions in digital video and data networking, further developed industry standards such as MPEG Digital Storage Media Command & Control (DSM-CC), and created and presented industry white papers. I continued to work on MPEG standards, including MPEG-4 Advanced Video Coding (AVC), as I joined World Wide Packets from 2000-2001, worked as a technology consultant in 2002-2003, Vice President of Technology for Tandberg Television from 2004-2010, Senior Vice President of Technology for Ericsson’s Media Solutions Group from 2011-2018, and Senior Vice President of Technology

of MediaKind from 2018-2020. During this time, I was part of the teams that received multiple Technology & Engineering Emmy Awards in the areas of media transport and MPEG-related technologies.

10. I am currently Vice President, Strategic & Technical Initiatives, at Sinclair, Lakewood Ranch, Florida. My duties include formulating and leading technical initiatives to perform proofs of concepts and rollout into commercial deployment of projects for Sinclair's broadcast TV stations and sports properties.

11. As shown in my CV, I am listed as the inventor on 6 issued patents in the areas of video on demand systems and video over ATM transmission, among others. A full list of publications I authored or coauthored is provided in my CV. I have also served as an expert in certain legal proceedings. A non-exhaustive list of cases in which I have testified at trial, hearing, or by deposition includes the following:

- Zenith Electronics Corp. v. WH-TV Broadcasting Corp., Case No. 01 C 4366, testified as an expert witness on Behalf of Zenith.
- *Ex Parte* Re-Exam of U.S. Patent No. 6,389,473, served as an Expert on behalf of the patent owner.

Over the years, I have been retained by both plaintiffs as well as defendants.

12. I am being compensated for my work in this case at my standard rate of \$500 per hour (plus reimbursement for expenses) in connection with my preparation of this report, as well as for each hour spent providing deposition or testimony. This compensation is not contingent upon my performance, the outcome of this case, or any issues involved in or related to this case. I have no direct financial interest in this matter.

III. MATERIALS CONSIDERED

13. The materials that I considered and relied upon in preparing my Declaration and forming my opinions include all exhibits cited to date in this Declaration and the Petition, including each of the Challenged Patents, their file histories, and the references asserted in the Petition. I have also reviewed and considered the Petition, the Patent Owner Preliminary Response, the Decision on Institution, and the exhibits cited therein.

14. I also have relied on my academic and professional experience in reaching the opinions expressed in this Declaration.

IV. RELEVANT LEGAL STANDARDS

15. I am not an attorney. In preparing and expressing my opinions and considering the subject matter of the Challenged Patents, I am relying on certain basic legal principles that counsel have explained to me. These principles are discussed below.

16. I understand that for an invention claimed in a patent to be found patentable, it must be, among other things, new and not obvious in view of what was known before the invention was made.

17. I understand the information that is used to evaluate whether an invention is new and not obvious is generally referred to as “prior art” and generally includes patents and printed publications (e.g., books, journal publications, articles on websites, product manuals, etc.).

18. I understand that in this proceeding the Petitioner has the burden of proving that the claims of the Challenged Patents are anticipated by or obvious in view of the prior art by a preponderance of the evidence. I understand that “a preponderance of the evidence” is evidence sufficient to show that a fact is more likely true than it is not.

19. I understand that prior art to the Challenged Patents in this proceeding includes patents and printed publications in the relevant art that predate the proper priority date of the alleged inventions.

20. I understand that terms appearing in the patent claims are to be interpreted according to their “ordinary and customary meaning” in an IPR proceeding. In determining the ordinary and customary meaning, the words of a claim are first given their plain meaning as they would have been understood by a

person of ordinary skill in the art (“POSITA”) at the time of the alleged invention, in light of the specification and file history.

21. I understand that treatises and dictionaries may be consulted, albeit under limited circumstances, to determine the meaning attributed by a POSITA at the time of the alleged invention. I have followed this approach in my analysis and have applied the ordinary and customary meaning of those terms throughout my analysis in this Declaration.

22. I understand that there are two ways in which prior art may render a patent claim unpatentable. First, the prior art can be shown to “anticipate” the claim. Second, the prior art can be shown to have made the claim “obvious” to a POSITA. In this declaration I focus on “obviousness.” My understanding of the legal standard for “obviousness” is set forth below.

23. I have been informed that a claimed invention is unpatentable as obvious if the differences between the invention and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a POSITA to which the subject matter pertains. I have also been informed by counsel that the obviousness analysis considers factual inquiries including the level of ordinary skill in the art, the scope and content of the prior art, and the differences between the prior art and the claimed subject matter.

24. Specifically, I understand that the obviousness question requires consideration of four factors (although not necessarily in the following order):

- The scope and content of the prior art;
- The differences between the prior art and the claims at issue;
- The knowledge of a person of ordinary skill in the pertinent art; and
- Whatever objective factors indicating obviousness or non- obviousness may be present in any particular case.

25. I have been informed by counsel that the Supreme Court has recognized several rationales for combining references or modifying a reference to show obviousness of claimed subject matter. Some of these rationales include the following: (a) combining prior art elements according to known methods to yield predictable results; (b) simple substitution of one known element for another to obtain predictable results; (c) use of a known technique to improve a similar device (method, or product) in the same way; (d) applying a known technique to a known device (method, or product) ready for improvement to yield predictable results; (e) choosing from a finite number of identified, predictable solutions, with a reasonable expectation of success; and (f) some teaching, suggestion, or motivation in the prior art that would have led a POSITA to modify the prior art reference or to combine prior art reference teachings to arrive at the claimed invention.

26. I understand the doctrine of claim differentiation to mean that differences among claims can be a useful guide in understanding the meaning of particular claim terms. In particular, the presence of a dependent claim that adds a particular limitation gives rise to a presumption that the limitation in question is not present in the independent claim.

V. THE '849 PATENT

A. The Technology Landscape of the Invention

27. During the early 2000s, mobile phones varied widely in hardware capabilities. This diversity in screen sizes, processor power, memory, and lack of dedicated media accelerators created significant challenges for delivering high-quality streaming audio and video. In addition, existing deployed cellular networks lacked the bandwidth and throughput to effectively implement video streaming. In this timeframe, the most widely deployed networks were GPRS or Edge, which are considered enhancements to 2G technologies, while the then-new 3G technologies (UMTS first, followed by HSDPA) were slowly rolling out and most devices did not yet support them. Exhibit 2032 [Kerner] (“EDGE was superseded by HSDPA and its uplink partner, HSUPA. According to 3GPP, there were 166 HSDPA networks in 75 countries at the end of 2007.”). Developers and content providers often had to make compromises, limiting quality or adopting lowest-common-

denominator solutions to ensure streams would play on the broadest range of devices.

1. Fragmented Device Capabilities and Platform Diversity

28. Mobile devices of that era came in an extraordinary variety of configurations, each with different multimedia support, if any. At the time of the patent's filing, it was well known that "more than 100 models of current-generation mobile phones" were in active use, and video services tended to "behave differently from phone to phone." Exhibit 2030 [Gerstel], 53.

2. Limited Processing Power and Lack of Hardware Acceleration

29. Processor limitations were a central obstacle. Early mobile CPUs had only a fraction of the power of PC processors and often lacked any hardware acceleration for video decoding. It was well known that mobile devices were "significantly constrained by limited resources. Exhibit 2031 [Chen], 1. Specifically, available processing power limited the streaming capabilities of these early phones. *Id.*

30. Codec choices illustrate this lowest-common-denominator approach. For example, many mobile services in the mid-2000s relied on the older H.263 video codec, despite its poor compression efficiency compared to newer technologies such as MPEG-4 AVC (H.264), because it had "extremely light" CPU decoding requirements suited to the modest CPU power in mobile devices. Exhibit

2030 [Gerstel], 51. This meant tolerating lower visual quality and higher bandwidth usage in order to ensure any reasonable playback quality on basic devices. Newer codecs like H.264 (MPEG-4 AVC) offered much better compression and quality, but without hardware decoder support they were often unusable on older phones. While in the mid-2000s it was anticipated that H.264 would soon become standard for mobile video, delivering “extraordinary image quality for a given data rate” (*id.* at 51), the reality was different. With a few years, it was understood mobile devices could not feasibly perform “full scale decoding of the video compressed in H.264 standard.” Exhibit 2031 [Chen], 42. Instead, improved processing power and memory were required in mobile devices in order to meet the decoding requirements of the then-new MPEG4-AVC standard (H.264). Industry experts soon thereafter agreed that complexity reducing methods were needed to effectively process video on mobile phones. Exhibit 2031 [Chen], 45 (“We will start with the most essential operations for such service in terms of reduced complexity video decoding on the mobile devices,” namely “[t]o develop a reduced complexity video coding scheme based on H.264/AVC standard.”).

3. Battery Life

31. Battery life was another important factor. Exhibit 2031 [Chen], 42. Complex decoding of high-quality video would quickly drain a mobile device’s battery. This reinforced the need for processor efficient decoding solutions.

4. Varying Screen Sizes and Resolutions

32. Mobile screens in the early 2000s ranged from tiny low-resolution displays of 176 by 144 pixels (sub-QVGA, $\frac{1}{4}$ of total pixels of a standard desktop VGA flip phones) to slightly larger PDA screens. *See, e.g.*, Exhibit 2030 [Gerstel], 50. This variability in screen size and resolution posed its own challenges for video streaming. *Id.*, 44 (“In particular, the display size of these devices can be quite different and the display resolution of these devices is usually much smaller than the resolution of original video.”). Thus, content formatted for a larger display often became illegible or unwatchable on smaller screens.

33. Moreover, the frame rates and resolutions usable on mobile were limited by both hardware and network. Typical mobile video streams were delivered at only about 8–10 frames per second, versus up to 30 fps for television. Exhibit 2030 [Gerstel], 50.

34. Streaming services as of 2005 often capped the video resolution to match the smallest screens and used low frame rates, ensuring smooth playback even if it meant a sub-optimal quality due to the aforementioned device limitations.

5. Memory and Storage Constraints

35. Early mobile devices also had limited memory, which affected streaming. For instance, phones in 2005 typically had 32 to 64 MB of memory for video storage. Exhibit 2030 [Gerstel], 50. At typical mobile bitrates (~128 kbps),

this was only enough for about 34–68 minutes of video in total. If a user subscribed to multiple streaming content providers, each provider could only have a few minutes of video cached on the device. This storage cap forced providers to keep video clips short and low-quality (to reduce file size), or to frequently overwrite cached content. Even streaming (without storing the whole file) required some buffer memory – a scarce commodity on devices that often had under one or two dozen MB of free RAM, resulting in stalling or limiting the length of continuous playback.

36. In addition, the absence of ample memory meant less tolerance for high-bitrate streams. A large video buffer might overflow a device's memory, so streams were kept at bitrates that produced small, manageable buffers. This often translated to lower video quality so that each second of video consumed only a small amount of data, thereby pushing stream durations and bitrates to remain low.

6. Lowest-Common-Denominator Solutions for Mobile Streaming

37. Facing this combination of tiny screens, weak processors, and minimal memory, along with the limited rollout of 3G cellular networks, streaming media providers around the time of the patent's filing often had to optimize for the lowest common denominator device.

B. Background of the Technology

38. The field of the '849 Patent is “multimedia transmission and playback for mobile clients.” Exhibit 1001 ['849 Patent], 1:6-8. As of April 2005, streaming on mobile devices was rudimentary or nonexistent. Exhibit 2015 [Polish Dep. Tr.], 22:24-23:3 (“I’m not aware of any products that were around [in April 2005] that would [] stream video.”). The iPhone would not go on sale until June 29, 2007, over two years later. Exhibit 2021 [Apple’s First iPhone article], 1. The flip phones and Blackberries of the time had limited ability to play video.

39. Historically, video streaming was performed by dedicated servers, using “stateful architecture,” to send a continuous packetized stream of data to client devices. Stateful architecture maintains server-side information about each client interaction. Exhibit 2025 [Geeks for geeks article] (“Stateful architecture maintains client session data on servers...”). Such architecture made streaming unnecessarily complex, especially in terms of performance and scalability. Exhibit 2018 [Gone in a flash article] (existing protocols weren’t “designed to ‘adapt’ the size of the encoded and streamed content based on the very specific conditions of a very specific client/player”). Even for large scale streamers, managing vast numbers of client video sessions posed meaningful technical and cost issues.

40. Mobile streaming, with its diverse mobile device diaspora, posed another problem. Industry consensus, such as through the World Wide Web

Consortium (W3C), revealed that Internet-based mobile communications suffered due to widely varying device processor and graphics capabilities, memory size, as well as assorted screen sizes and resolution constraints. *See* Exhibit 2015 [Polish Dep. Tr.], 23:11-21 (“there were constraints in all directions ... [mobile phones] were still very expensive ... there were also big limitations in power consumption...”).

41. Traditional streaming could not adequately account for these myriad hardware constraints. For example, an old or low-end smartphone may have only been able to process video and audio at bitrates of 400 kbps and 64 kbps, respectively, at a frame size of 320 x 240 pixels, and at a frame rate of 30 fps. In contrast, newer mobile hardware may have been capable of exceeding video and audio bitrates of 3.5 Mbps and 160 kbps, respectively, at a frame size of 1280 x 720 pixels, and at a frame rate of 30 fps.

42. Further exacerbating these issues was that mobile devices lacked sufficient processing power. Thus, decoding the video stream, without more, would lead to problematic playback. A solution was needed so that multimedia could be streamed across different bandwidths and different hardware.

C. Overview of the ‘849 Patent

43. Prior to the earliest effective filing date in April 2005, methods of distributing multimedia data over the wireless internet to mobile clients were

“constrained by existing wireless bandwidth, and the real-time decoding, processing and displaying of multimedia content with limited hardware capabilities.” Exhibit 1001 [’849 Patent], 1:13-16. “These hardware limitations include slow CPUs, high memory latencies, slow drawing capabilities and the absence of YUV to RGB conversion [*i.e.*, transforming color information from one color space to another] in the hardware.” *Id.*, 1:16-20. Most mobile devices could not support multimedia playback, and even on those that could, video was limited to low frame rates and suffered from minimal bandwidth. *Id.*, 1:33-48. Decoders for complex video (*e.g.*, MPEG-4) and audio (*e.g.*, AAC) were known but “require[d] multiple parallel processes and fast processing,” which were not available on mobile devices at the time. *Id.*, 1:49-60. While Java players for cell phones had been developed, “implementations of true, platform independent, MPEG4 Java decoders that will play video on cell phones [were] not known” and “no Java players [were] known that will play AAC [audio].” *Id.*, 2:4-18. And although streaming technologies were in development, they did “not address specific continuity and deployment issues for wireless multimedia transmission and concurrent playback on a limited-tasking cell phone handsets.” *Id.*, 2:19-43.

44. These limitations rendered conventional streaming technologies inadequate, often resulting in poor video and audio quality or preventing playback altogether. The ’849 Patent and its ancestor applications sought to address these

limitations by, among other things, expanding and improving on prior methods for multimedia transmission and mobile playback, and enabling fluid playback of high-quality video and audio on constrained mobile devices. *Id.*, 2:44-46.

45. The '849 Patent discloses a comprehensive solution comprising several interrelated aspects. The patent explains:

In a *first aspect* the invention provides a method of efficient multimedia object creation. In a *second aspect* the invention deployment addresses the limitations of large-scale multimedia transmission on cellular networks to wireless clients. In a *third aspect*, the invention relates to methods of decoding of video, sufficiently optimized to be played on a limited wireless client. In a *fourth aspect*, the invention relates to methods of decoding of audio, sufficiently optimized to be played on a limited wireless client. In a *fifth aspect*, the limited mobile handset multimedia object player, for both MPEG4 video decoding and AAC audio decoding, is implemented as a device-hardware-independent java (J2ME) applet.

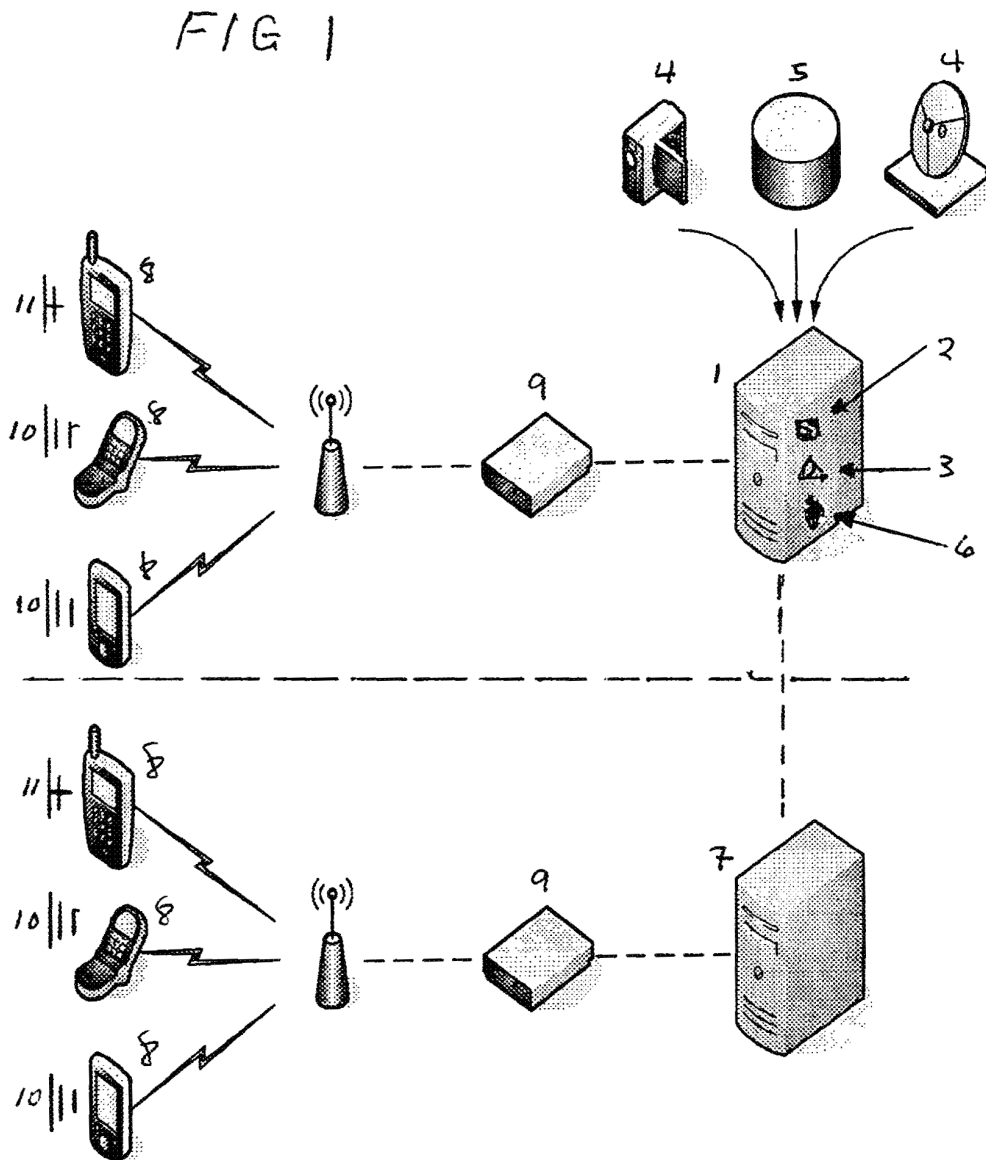
Id., 2:50-63 (emphasis added). These features were novel at the time and contributed to solving the problems with conventional methods for multimedia transmission and playback on mobile devices.

46. Ultimately, solutions such as those described in the '849 patent would be adopted into what was known as adaptive bitrate technology, or ABR. As of April 2005, the term ABR did not exist, and it was still several years until the

industry started adopting what would come to be known as ABR. One of the earliest examples was ABC.com's 2007 adoption of Move Network's adaptive rate streaming technology for its streaming service. Exhibit 2022 [ABC.com article]. Other networks, such as Fox, implemented similar solutions around the same time frame. Move.com's patent application 12/416,085 titled "Adaptive Bitrate Management For Streaming Media Over Packet Networks," filed in 2009, is one of the earliest patent filings using the term adaptive bitrate. Exhibit 2026 [Melnyk].

1. The '849 Patent's "Distributed Network System for Multimedia-on-Demand"

47. As shown below, Figure 1 of the '849 Patent discloses a distributed network system for live and on-demand multimedia. *Id.*, 4:66-5:7, Fig.1.



48. The system includes a centralized content server (1) with a transcoder (2) and multimedia object creator (3) that creates multimedia objects from live broadcasts (4) or archived multimedia files (5). The centralized content server (1) includes an indexing host system (6) to deploy multimedia objects to content servers (7) and wireless clients (8). Proxy cellular network http servers (9) cache

multimedia objects for efficient delivery to wireless clients (8), which run novel multimedia object java applets (10) or embedded/downloaded multimedia players (11). *See id.*, 4:66-5:7, 6:18-31.

2. The '849 Patent Teaches a Novel Multimedia Player that Maintains Fluidity, Video Quality and Audio Quality

49. The system disclosed in the '849 Patent provides technological advantages over prior approaches by employing a novel multimedia player that maintains fluidity and quality by selecting multimedia objects that reflect available network bandwidth, autonomously adjusting selection and playback according to multimedia object parameters and supplied path identification, and using optimized decoding processes to maintain quality playback. *See, e.g., id.*, cls. 1, 6, 7. These operations are performed together, and all are performed at the mobile client itself, rather than being handled at the server or network level. *Id.* This local control allows for adaptation to the device's processing capacity and network conditions, ensuring that video and audio playback remain synchronized and maintain acceptable quality and fluidity.

50. The decoder optimizations and strategies used by the multimedia player allow playback of live audio and video on limited mobile devices:

In FIG. 1 the multimedia object player 10 is a downloadable Java (J2M2) applet and ***the described audio and video decoder optimizations and strategies, FIGS. 7-13 and FIGS. 15-20, as***

applied to standard MPEG4 and AAC decoding make it possible for the multimedia object player 10 to playback live music and video, at acceptable frame rates (5-15 fps), on limited, cell phone handsets.

Java cannot take advantage of hardware capabilities in processing the huge number of calculations and variables required for either MPEG4 decoding or AAC decoding.

Id., 18:64-19:9 (emphasis added). These optimizations “permit the playback of AAC and MPEG4 on current mobile client hardware” and “are a source of technological innovation and advance.” *Id.*; *see also id.*, 4:44-57.

51. The '849 Patent discloses a number of novel optimized decoding processes for video and audio decoding on limited mobile devices. Exhibit 1001 ['849 Patent]., 4:7-43. With respect to optimized video decoding, the patent describes, for example, optimized Huffman codebook methods for video decoding, texture buffering, motion compensation without bilinear interpolation, optimized pixel processing and dequantization, novel uses of Chen's algorithm, novel YUV to RGB conversions, and decoding shortcuts. *Id.*, Figs.7-13; *see also generally id.*, 11:28-14:60. The patent further describes optimized audio decoding processes, including for instance optimized Huffman codebook methods for audio decoding, optimized IMDCT implementation, input short-cut processes specific to AAC Low Complexity (LC) audio decoding profile, IMDCT short window processing, and low energy gap timing. *Id.*, Figs.15-20; *see also generally id.*, 15:12-18:63. And

further, these optimized processes sought to overcome the problem that “[t]ypical mobile processors have integer math only, [and] little or no on-CPU cache” requiring techniques of “getting maximum” quality out of these very limited devices. Exhibit 1001 [’849 Patent], 4:26-30. *See also, id.*, 12:60-63 (“The use of an effective integer-based algorithm is an absolute requirement when the decoding occurs on constrained devices.”)

52. Concepts such as those described above (e.g., client devices selecting multimedia objects based on available bandwidth) would later be embodied in ABR technology. As discussed above, at the time of the ’849 Patent (April 2005), it was still several years before ABR was adopted in the industry.

53. In sum, the ’849 Patent describes a coordinated solution that overcomes the technical challenges of multimedia playback on mobile clients with constrained resources. Its combination of multimedia object transmission, content delivery, and sophisticated multimedia player that employs decoding optimizations implemented entirely within the client itself represented a significant advance over the prior art at the time of the invention in 2005.

D. Challenged Claims

54. Independent claims 1, 6, and 7 (and claims dependent therefrom) of the ’849 Patent are directed to a “multimedia player” that plays multimedia objects

in a sequence “such that fluidity, video quality and audio quality are maintained.”

Claim 1 is representative:

[preamble] A method comprising:
[a.i] receiving audio and video segments encoded in a digital encoding format and with an encoding rate;
[a.ii] wherein, said audio and video segments are associated with object parameters and supplied host path identification to form multimedia objects;
[b.i] requesting by a multimedia player, transmission of said multimedia objects;
[b.ii] wherein said multimedia objects are located using http and received by said multimedia player from servers using a wireless connection;
[c.i] playing back received multimedia objects by the multimedia player,
[c.ii.1] wherein the multimedia player is configured to play multimedia objects in a sequence such that fluidity, video quality, and audio quality are maintained by

[c.ii.2] selecting a plurality of said multimedia objects that reflect available network bandwidth,

[c.iii] autonomously adjusting said selection and playback according to the multimedia object parameters and supplied host path identification, and by

[c.iv] utilizing optimized decoding processes to maintain quality playback.

55. In my opinion, the claims require the multimedia player to be configured to maintain fluidity, video quality and audio quality by performing three operations—(1) “selecting...,” (2) “autonomously adjusting...,” and (3) “utilizing optimized decoding processes.” Exhibit 1001 [’849 Patent], cls. 1, 6, 7. Each claimed operation is controlled by the multimedia player in order to maintain fluidity, video quality and audio quality.

E. Priority Date

56. The ’849 Patent is a continuation of U.S. App. No. 15/016,821, filed on February 5, 2016, which published as U.S. Patent No. 10,171,873. Exhibit 1001 [’849 Patent], [63]. The ’821 Application is a continuation of U.S. App. No. 11/107,952, filed on April 18, 2005 (abandoned.) *Id.* The earliest effective filing date of the claims of the ’849 Patent is therefore April 18, 2005. For purposes of

my opinion herein, I have been asked to use April 18, 2005 as the earliest effective filing date.

F. Prosecution History of the '849 Patent

57. The '849 Patent issued from U.S. App. No. 16/181,285 ("the '285 Application"), filed on November 5, 2018. Exhibit 1001 ['849 Patent], [21-22]. Following several rounds of rejections by the USPTO Examiner and claim amendments by the applicant, the '285 Application received a Notice of Allowance on July 2, 2020.

58. On April 16, 2020, in response to a final rejection, the Applicant distinguished the prior art Vetro reference in part by distinguishing maintaining semantic fidelity and further compression (in Vetro) from maintaining smooth quality playback (as claimed in the '849 Patent):

Maintaining semantic fidelity and further compression are NOT the same as optimized player decoding. Semantic fidelity is based on extracted bitstream characteristics for encoding and transmission control by using the Vetro predictor model and transcoder to adaptively adjust the bitstream for network bandwidth and to tailor it to operational player characteristics/limitations. Maintaining smooth quality playback, based on playback efficiency in my specification, involves other factors, and involves dynamic player executed configurations and optimized decoding, based on the parsed multimedia objects.

EX1008 [FH], 582.

59. In response, the Examiner issued a Notice of Allowance on July 2, 2020. According to the Examiner:

Independent claim 33 recites the following limitation: “wherein the multimedia player is configured to play multimedia objects in a sequence such that fluidity, video quality and audio quality are maintained by selecting a plurality of said multimedia objects that reflect available network bandwidth, autonomously adjusting said selection and playback according to the multimedia object parameters and supplied host path identification”. This limitation of independent claim 1 in combination with the other limitations recited in the claim is the reason for allowance.

Exhibit 1008 at 589. Thus, the claimed “multimedia player,” in combination with the claimed steps for maintaining fluidity, video quality and audio quality, was identified as the “reason for allowance.” *Id.*

60. As explained below, these features (*e.g.*, the “multimedia player” that “is configured to play multimedia objects in a sequence such that fluidity, video quality and audio quality are maintained” by (1) “selecting...,” (2) “autonomously adjusting...,” and (3) “utilizing optimized decoding processes to maintain quality playback”) of the invention disclosed and claimed in the ‘849 Patent distinguish it from the prior art relied upon by Petitioner in this proceeding.

G. Level of Ordinary Skill in the Art (“POSITA”)

61. In my opinion, the level of ordinary skill in the art as of the priority date for the inventions claimed in the ‘849 Patent is a person with a bachelor’s degree in electrical engineering, computer engineering, computer science, or a

related field, and two to three years of experience in the design or development of (1) video processing systems, audio processing systems, and/or the equivalent; and (2) networking and communications systems, or the equivalent. Additional graduate education could substitute for professional experience, or significant experience in the field could substitute for formal education.

62. Petitioner has alleged that a POSITA “would have possessed at least a bachelor’s degree in computer science, computer engineering, electrical engineering, or an equivalent field requiring learning computation principles, and two years of work experience in networking or streaming media systems, particularly audio and video, over the Internet.” Pet., 5.

63. The Decision on Institution found no material difference between the Petition’s proposed level of ordinary skill and Petitioner’s, and that the obviousness analysis would be the same under each party’s assessment. D.I., 11. My analysis herein would be the same under either level of ordinary skill.

64. Based on my qualifications described above, I was at least a POSITA as of April 18, 2005. My opinions herein are from the perspective of a POSITA as of that date.

VI. CLAIM CONSTRUCTION

65. I understand that claim terms should normally be given their ordinary and customary meaning as would be understood by a POSITA in light of the intrinsic record.

66. I am aware that there have been some claim construction proceedings in the district court. The parties' joint preliminary claim constructions have been filed as Exhibit 2013 to this IPR. I believe my opinions below are consistent with the Plaintiff / Patent Owner's proposed constructions from the district court. However, my opinions below do not change under any reasonable construction of the claim terms in the Challenged Claims.¹ Thus, I do not believe any terms require

¹ I note Petitioner Google argued that the terms "optimal," "optimized decoding processes," "fluidity," and "maintain quality playback" were indefinite in the district court. Exhibit 2013 [Joint Claim Construction Statement], 6-11. The Petition does not argue that these terms are indefinite. Pet., 13, Exhibit 1002 [Polish Decl.], 29; Exhibit 2015 [Polish Dep. Tr.], 26:16-18 ("I am not explicitly construing any of the claim terms in here. I'm just using plain and ordinary meaning.").

express construction for purposes of this *inter partes* review. To the extent a claim construction issue arises in this *inter partes* review, I reserve the right to respond.

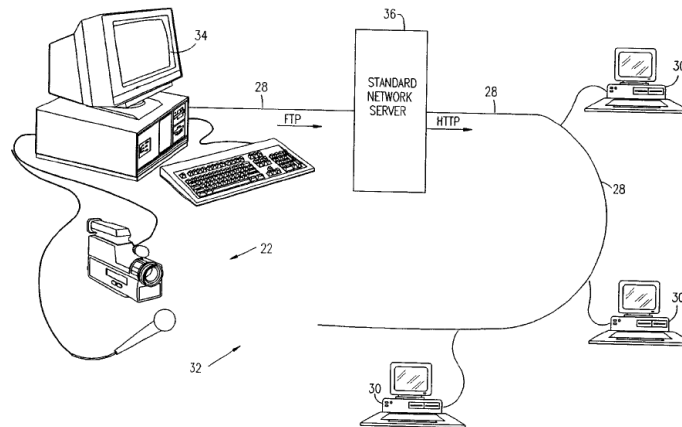
VII. OVERVIEW OF THE CITED REFERENCES

67. The petitioned grounds include the following alleged prior art references:

Ground	Claims	Basis for Challenge under §103(a)
1	1-9	Carmel in view of Mattavelli
2	1-9	Carmel in view of Wang
3	1-9	Carmel in view of Wang and Wolters
4	1-9	Carmel in view of Wang, Wolters, Guo, Yu, and Forecast
5	1-9	Carmel in view of Mattavelli, Guo, Yu, and Forecast

A. Carmel (Exhibit 1003)

68. Carmel relates to “real-time multimedia broadcasting over a network.” EX1003 [Carmel], 1:11-13. Multimedia data is prepared and transmitted over a network in real-time from a transmitting computer 34 to one or more client computers 30 (*e.g.*, conventional personal computers or workstations). *Id.*, 2:1-21. *See also id.*, Fig. 1:



69. To prepare the multimedia data, Carmel teaches dividing a media stream into slices and forming them as a sequence of files. The files are then transmitted to the client computer (upon client's request) over the network. 2:1-21.

70. Carmel also teaches using indexing and timing information to ensure proper synchronization and playback of content by the client computer. Carmel explains that the system monitors time codes “to ensure that the transmission or reception is ‘keeping up’ with the input of the data,” and if lag is detected, “steps are taken” to increase throughput. *Id.*, 3:36–41. This mechanism ensures that the segments are transmitted in real time.

71. Upon download, the multimedia sequence is decoded and played back “just as it was input” at the transmitting computer 34. *Id.*, 10:50-54. In other words, Carmel teaches decoding and playing back at the client computer 30 the ***unmodified*** multimedia sequence of files regardless of the client computer's existing processing constraints.

B. Mattavelli (Exhibit 1004)

72. Mattavelli discloses “the Computational Graceful Degradation (CGD) approach for the implementation of video decoding.” Exhibit 1004 [Mattavelli], 1. According to Mattavelli, “[t]he main rationale of the Computational Graceful Degradation (CGD) approach is to provide results of poorer quality when the results of the desirable quality cannot be obtained in real time.” Exhibit 1004 [Mattavelli], 1.

73. According to Mattavelli, the CGD approach results in “lower,” “poorer,” and “degraded” quality video when there is limited processing power available at the mobile device. *See id.* at 1 (“The goal is to provide results of possibly lower visual quality, but respecting the real-time constraints, when the required processing needs exceed the available processing resources.”), 1 (“When the complexity of the task exceeds the available processing power, realtime services, possibly of *degraded quality*, are nevertheless guaranteed respecting all real-time constraints.”) (emphasis added), 1 (“In our case, the goal is to guarantee real-time video decoding with possible *degradation of the image quality, i.e. reduction of the peak signal to noise ratio (PSNR)*, without loosing [sic] parts of the image content.”) (emphasis added), 4 (“Obviously, the execution of any f_i^{CGD}

may *produce PSNR degradations in the reconstruction of some image parts...*") (emphasis added).

C. Wang (Exhibit 1007)

74. Wang discloses a prototype “baseline MPEG-4 AVC (Advanced Video Coding) decoder based on an optimized platform-based design methodology” that “jointly optimize[s] the software and hardware design of the decoder.” Exhibit 1007 [Wang], 1. According to Wang, such a platform-based prototype design “has multiple advantages including efficient system-level design methodology, short time-to-market, reusability of software and hardware IP blocks, feasible chip integration, etc. Thus, the platform-based design methodology is adopted for this project.” *Id.*, 2. Wang summarizes the platform-based decoder as follows:

To address the problems of extended design cycle and less performance in the case of general purpose processor, *we propose an optimized platform-based architecture with macroblock (MB) level pipelining to implement a baseline MPEG-4 A VC decoder.* On this platform, *a general purpose processor controls the decoding processes and dedicated acceleration modules are used to speed up the computationally intensive tasks.* The accelerators are realized with programmable logic modules to retain the flexibility. In addition, a specific system bus is used to remove the bottleneck for data communications between modules. Subsequently, the proposed

architecture is evaluated on an ARM966 platform. Our results show that the optimized software without hardware acceleration can achieve a decoding rate up to 5 frames per second (fps) for the video sequences in QCIF resolution. *With the new dedicated accelerators, the decoding throughput is increased by about 30% to reach 6.6 fps on the average and is up to 10.3 fps for slow motion video sequences.*

Id., 1 (emphasis added).

D. Wolters [Exhibit 1041]

75. Wolters relates to a computationally intensive audio compression standard called High-Efficiency Advanced Audio Coding (HE AAC). Exhibit 1041 [Wolters], 1. Wolters “provides an implementation guideline and provides an overview of the technologies and system integration aspects of HE AAC.” *Id.*, 2.

E. Guo (Exhibit 1051), Yu (Exhibit 1061), and Forecast (Exhibit 1016)

76. Petitioner relies on Guo, Yu, and Forecast in Grounds 4 and 5. Specifically, Petitioner relies on: (1) Guo for “teachings on the use of multiple servers to serve multimedia segments ((possibly) recited in claim element 1[b.ii])”; (2) Yu for “teachings regarding transcoding (recited in claims 3 & 8)”; and (3) Forecast for “teachings regarding splitting a video stream at an I-frame (recited in claims 4 & 5).” *See* Pet. at 78, 86.

77. Guo relates to a “method and system for caching streaming multimedia on the Internet.” Exhibit 1051 [Guo], Title. Guo discloses “using helper servers” that “operate as caching and streaming agents inside the network” to enhance “existing caching technique” and “better support streaming multi media over the Internet.” Exhibit 1051 [Guo], 2:56-61.

78. Yu “provides rate control with a picture-based lookahead window for encoders/ transcoders having mixed codecs in a dual-pass compressed video architecture.” Exhibit 1061 [Yu], 1:56-59.

79. Forecast “relates to processing of compressed audio/visual data, and more particularly to splicing of streams of audio/visual data.” Exhibit 1016 [Forecast], 1:14-16. “[V]ideo access units of the transport stream encode the video presentation units using a data compression technique and contain a variable amount of compressed video data.” *Id.*, 3:1-4. A “file server computes metadata for splicing of the transport stream, and stores the metadata for splicing in the file.” *Id.*, 3:6-9.

VIII. SUMMARY OF OPINIONS

80. In my opinion, Grounds 1-5 of the Petition fail to prove by a preponderance of the evidence that the challenged claims are unpatentable. Below, I expand on my opinion with supporting analysis and evidence.

A. “To Maintain Quality Playback”

81. I understand the Decision on Institution raised an issue of whether or not “to maintain quality playback” is a statement of intended use or intended purpose in claims 1, 6 and 7. D.I., 25-26. I understand that if “to maintain quality playback” is a statement of intended use or purpose, the limitation “to maintain quality playback” does not limit the scope of the claim and need not be taught or suggested by the asserted references. I understand that if “to maintain quality playback” is not a statement of intended use or purpose, the limitation “to maintain quality playback” does limit the scope of the claim and must be taught or suggested by the asserted references.

82. In my opinion, the limitation “to maintain quality playback” is structural. It modifies “utilizing optimized decoding processes.” EX1001 [’849 Patent], cls. 1, 6, 7. Thus, it is narrowing the term “optimized decoding processes” to those decoding processes that are used to maintain quality playback. The fact that an optimized decoding process is used does not mean that quality playback is being optimized. The limitation “to maintain quality playback” specifies that quality playback is the parameter being optimized. Thus, it is structural in nature.

83. “To maintain quality playback” also modifies, and refers back to, the earlier limitation “wherein the multimedia player is configured to play multimedia objects in a sequence such that fluidity, video quality and audio quality are

maintained.” Exhibit 1001 [’849 Patent], cl. 1. As shown below, the final three limitations of claim 1 disclose the steps the multimedia player undertakes to maintain fluidity, video quality and audio quality:

wherein the multimedia player is configured to play multimedia objects in a sequence such that fluidity, video quality and audio quality are maintained by

selecting a plurality of said multimedia objects that reflect available network bandwidth,
autonomously adjusting said selection and playback according to the multimedia object parameters and supplied host path identification, and by
utilizing optimized decoding processes to maintain quality playback.

Exhibit 1001 [’849 Patent], cl. 1. The limitations in independent claims 6 and 7 are similar. *Id.*, cls. 6, 7. In each case, fluidity, video quality and audio quality are maintained by performing the three additional limitations, including “utilizing optimized decoding processes to maintain quality playback.” These limitations are structural because they are central to performing the claimed invention. “Utilized optimized decoding processes to maintain quality playback” is one of the steps that must be performed to maintain fluidity, video quality and audio quality.

84. This is consistent with the term’s use in the specification. The specification explains that the term “maintain” indicates that attempting to ensure

that certain condition(s) or state(s) would continue. *See, e.g.*, EX1001 [’849 Patent], 3:24-26 (“To minimize delays that will occur to ***maintain*** synchronicity between the client and server, a larger multimedia object window can be dynamically created on the host server.”); 7:35-37 (“To reduce delays that will occur to ***maintain*** synchronicity between the client 8 and server 1 or 7, a larger multimedia object window can be used.”); 13:64-67 (“On very limited devices short-cuts in the decoding process must be made to allow the device to ***maintain*** synchronicity between the audio and video playback.”) (emphasis added).

85. With respect to the term “quality,” the specification teaches that, in certain embodiments, different levels of quality may be maintained based on the processing power of the mobile device itself. *See* EX1001 [’849 Patent], 13:60-14:15 (“This mechanism allows video coding to scale in complexity based on the processing power of the device being used.”). *Id.*, 14:3-5 (“This mechanism allows video decoding to scale in complexity based on the processing power of the device being used.”), 13:64-67 (“On very limited devices, short-cuts in the decoding process must be made to allow the device to maintain synchronicity between the audio and video playback.”).

86. The three claimed steps reflect a similar approach by (1) selecting multimedia objects that “reflect available network bandwidth,” (2) adjusting selection and playback “according to the multimedia object parameters and

supplied host path identification, and (3) “utilizing optimized decoding processes to maintain quality playback.” EX1001 [’849 Patent], cl. 1. In short, the claims select the appropriate level of quality and then uses a decoding process that is optimized for that level to attempt to maintain the appropriate level of quality playback. Thus, the specification discusses that the decoding process itself is optimized to work to maintain a specific level of video and/or audio quality.

87. I have been informed that, during patent prosecution, when a patent applicant relies on a claim term to distinguish over the prior art, that claim term is limiting. In the prosecution history for the ’849 Patent, the Applicant clearly relied on “maintain quality playback” to distinguish the claimed invention over the prior art. In a November 5, 2018 Response to an office action, the Applicant distinguished the Vetro reference because it did not disclose “maintaining [] quality playback” as required by the claims:

Maintaining semantic fidelity and further compression are NOT the same as optimized player decoding. Semantic fidelity is based on extracted bitstream characteristics for encoding and transmission control by using the Vetro predictor model and transcoder to adaptively adjust the bitstream for network bandwidth and to tailor it to operational player characteristics/limitations. Maintaining smooth quality playback, based on playback efficiency in my specification, involves other factors, and involves dynamic player executed configurations and optimized decoding, based on the parsed multimedia objects.

EX1008 [FH], 582. The patent applicant distinguishes “maintaining smooth quality playback” from prior art that taught “maintaining semantic fidelity.”

88. Thus, each of the limitations “selecting a plurality of said multimedia objects that reflect available network bandwidth,” “autonomously adjusting said selection and playback according to the multimedia object parameters and supplied host path identification” and “utilizing optimized decoding processes to maintain quality playback” are structural in nature because they are the steps the multimedia player takes to maintain fluidity, video quality and audio quality and, by extension, maintain quality playback. In my opinion, the term “to maintain quality playback” provides necessary structure to the limitations.

89. I note that the Decision on Institution stated that “to maintain quality playback” in claim 7 “does not appear to be a statement of intended use because the claim recites ‘configured to.’ Pet., 26. The Decision on Institution further asks whether this language “creates a presumption that claims 1 and 6 recite intended purpose and intended use, respectively.” *Id.* I understand the Board to be suggesting a claim differentiation argument between the three independent claims.

90. The relevant language of claims 7 and 1 appears virtually identical. Pet., 66 (“claim 7 is materially the same as claim 1 except that it is written as a system for performing a method instead of a method.”). Claim 7 requires a “multimedia player configured to ... play back received multimedia objects in a sequence such that fluidity, video quality and audio quality are maintained by ... utilizing optimized decoding processes to maintain quality playback.” Exhibit 1001

[’849 Patent], cl. 7. Claim 1 requires “the multimedia player is configured to play multimedia objects in a sequence such that fluidity, video quality and audio quality are maintained by ... utilizing optimized decoding processes to maintain quality playback.” Exhibit 1001 [’849 Patent], cl. 1. The only difference is the use of “*a* multimedia player” in claim 7 and “*the* multimedia player” in claim 1. To address the issue raised by the Board, both claims require a “multimedia player *configured* ... to maintain quality playback.” I would interpret this virtually identical language in the same way in both claim 1 and claim 7.

91. Claim 6 is substantially similar to claims 1 and 7. Pet., 65 (“claim 6 is materially the same as claim 1 except that it is written as a claim to a device (*i.e.*, multimedia player) that includes computer executable instructions for performing a method instead of a method.”). In claim 6, the relevant claim language is “a multimedia player comprising computer executable instructions stored on a non-transitory computer readable medium which when executed by a processor ... plays back received multimedia objects in a sequence such that fluidity, video quality and audio quality are maintained by ... utilizing optimized decoding processes to maintain quality playback.” Exhibit 1001 [’849 Patent], cl. 6. While the claim uses the term “multimedia player *comprising*” rather than “configured to,” it comprises “computer executable instructions stored on a non-transitory computer readable medium which when executed by a processor” that perform the

claim limitation “utilizing optimized decoding processes to maintain quality playback.” *Id.*

92. In my opinion, this means, when the “computer executable” instructions are “executed by a processor,” the multimedia player must perform the claimed steps, including “utilizing optimized decoding processes to maintain quality playback.” *Id.* In my opinion, the language of the claim does not permit the “to maintain quality playback” limitation to be optional or aspirational.

93. In my opinion, the difference between claims 7 and 6 is largely that claim 7 is directed to the system including a multimedia player while claim 6 focuses more narrowly on the computer executable instructions stored on the multimedia player. The substantive limitations are largely identical.

94. My opinions below on the patentability of the challenged claims do not change regardless of whether “to maintain quality playback” is determined to be an intended use. As discussed below, in my opinion Grounds 1 and 2 (and, by extension, Grounds 3-5) fail for reasons independent of the “to maintain quality playback” limitation.

B. Carmel and Mattavelli Do Not Teach Or Suggest The Challenged Claims (Ground 1)

1. Carmel and Mattavelli Do Not Teach Or Suggest “Autonomously Adjusting Said Selection and Playback According To The Multimedia Object Parameters And Supplied Host Path Identification” (Limitations 1[c.iii], 6[c.iii] and 7[c.iii])

95. The Petition alleges Carmel and Mattavelli disclose limitation 1[c.iii] and the corresponding limitations in claims 6 and 7. Pet., 40-45, 65-67. In my opinion, neither reference discloses autonomously adjusting playback according to multimedia object parameters and supplied host path identification.

96. The '849 Patent explains that wireless multimedia streaming in April 2005 was “constrained by ... the real-time decoding, processing and displaying of multimedia content with limited hardware capabilities.” EX1001 ['849 Patent], 1:12-16. Thus, on the client side, “[t]he buffering and playback of multimedia objects in a synchronized fashion is critical to fluid playback.” *Id.*, 3:38-43. That is, different mobile phones at the time had different capabilities (e.g., different amounts of processing power and memory, different screen sizes and resolutions, etc.). This claim limitation recognizes that the playback on a given device is adjusted according to multimedia object parameters such as the size of the visual frame. *Id.* So, for example, different frame sizes must be adjusted to display correctly on different screen sizes.

97. Carmel discloses selecting a transmission quality level based on available bandwidth. Pet., 41-42; EX1003 [Carmel], 11:2-7 (“After reading header 43 and, preferably, making an initial assessment of the link bandwidth, the client selects one of the available quality levels in the stream.”). But this assessment involves adjusting the quality level of the data stream (i.e., “the rate of data transfer over the link from the server” (EX1003 [Carmel], 11:9-11)), not the playback of the data.

98. The Petition argues that Carmel “teaches and suggests that the client/multimedia player is configured to identify and locate ... the successive slices (having a new quality level) that the media player will receive, decode and output/play.” Pet., 42-43 (*citing* EX1003 [Carmel], 10:64-11:22, Fig. 6B). Nothing in the cited portion of Carmel discusses any change to the playback itself, let alone adjusting playback according to multimedia object parameters and supplied host path identification. Instead, the citation discloses that the audio/video level is determined based on the “link rate.” *Id.*, Fig. 6B.

99. The Petition cites Carmel 7:28-49 (Pet., 43), but that section discusses “adjust[ing] the data streaming rate to the available bandwidth.” EX1003 [Carmel], 7:28-49. It does not discuss adjusting the playback. Similarly, the Petition cites Carmel 10:48-63 (Pet., 43). That section states in part “[t]ime stamps in the data stream are used to synchronize the data, so that the multimedia sequence is played

back just as it was input at computer 34, preferably with only a minimal necessary transmission and decoding delay.” EX1003 [Carmel], 10:50-54. “Just as it was input” at computer 34 (*i.e.*, Carmel’s transmitting computer) indicates that media is played in the same order as it was input. Minimal necessary “decoding delay” is directed to real-time aspect of Carmel’s invention, which is different from the concept of fluidity or maintenance thereof. The multimedia slices use time stamps so that data slices are played in the correct order. Even though the time stamp tells the receiving device when to playback the slice, the receiving device in some instances may be incapable of playing back the slide at the time of the timestamp. This could happen if the slice is not available in time due to network impairment or the inability of decoder to have the slice ready in time for playback at the time it states it needs to be. Thus, the section has nothing to do with *adjusting playback* according to multimedia object parameters and supplied host path identification. That is, the order the data slices are played stays the same regardless of the quality and fluidity of the playback.

100. Because Carmel does not disclose this limitation, the Petition argues alternatively that Mattavelli discloses the limitation. Pet., 44-45. But Petitioner generically argues that “Mattavelli teaches techniques where the decoder/media player uses object parameters (including, *e.g.*, decoding complexity metadata that is available with the MPEG-4 standard) to determine when and by how much to

adjust the decoding/playback of received video segments.” (citing EX1007 [Mattavelli] 2309, 2310-2311 and EX1002 [Polish Decl.], ¶197). None of the cited portions of Mattavelli discuss adjusting playback according to multimedia object parameters and supplied host path identification. Instead, the cited portions discuss executing CGD based on “predicted decoding time” and “complexity information.” EX1007 [Mattavelli] 2309, 2310-2311; EX1002 [Polish Decl.], ¶197. Indeed, Mattavelli does not even use the term “playback.” Carmel and Mattavelli do not teach or suggest this limitation.

2. Carmel Does Not Teach or Suggest Maintaining Fluidity

101. Claim 1.c.ii requires “wherein the multimedia player is configured to play multimedia objects in a sequence such that fluidity, video quality and audio quality are maintained by” performing three distinct claimed steps. Exhibit 1001 [’849 Patent], cl. 1. The Petition alleges Carmel alone satisfies this limitation. Pet., 35-40. In my opinion, Carmel does not teach or suggest this limitation.

102. “Fluidity” refers to the smoothness and continuity of playback as perceived by the viewer, specifically the absence of jitter, freezes, or choppiness. EX2013 [Joint Claim Construction Statement]; 13. *See also* Exhibit 2027 [Pastrana-Vidale], 2 (“Severe motion discontinuities are one of the most common degradations in video streaming. The end-user perceives a jerky motion when the discontinuities are uniformly distributed over time and an instantaneous fluidity

break is perceived when the motion loss is isolated or irregularly distributed.”); Exhibit 2028 [Casale], 3 (“video-stream fluidity” measured by “jitter” metric). A video is fluid only when a playback is sufficiently stable and proceeds without interruptions or irregular timing. *Id.*

103. Consistent with the above, the ’849 Patent discusses that “buffering and playback of multimedia objects in a synchronized fashion is critical to fluid playback.” Exhibit 1001 [’849 Patent], 3:43-45. The use of “buffering” indicates that fluid playback means continuous, smooth playback. A buffer “smooths out a data transfer when one side has a slower connection or less processing ability than the other side.” Exhibit 2024 [Techterms]. Maintaining a buffer along with autonomously adjusting a plurality of multimedia objects that reflect available network bandwidth enables the ’849 Patent to absorb small variations in said network bandwidth, which helps maintain fluidity for a continuous smooth playback. *Id.*; Exhibit 1001 [’849 Patent], 3:43-45.

104. In my opinion, Carmel does not disclose maintaining fluidity of playback as required by the claims. The terms fluidity and fluid are not used in Carmel. Exhibit 1003 [Carmel]. Carmel does not disclose buffering. While the Petition states that Carmel discloses maintaining fluidity (Pet., 35-40), the portions of Carmel cited by Petitioner do not mention fluidity. The cites from Carmel in the Petition generally discuss sequencing data slices. *See id.* But playing back data

slices in the same sequence they were input does not guarantee that the playback will be fluid. As discussed above, it is entirely possible (especially in streaming or decoding scenarios) for a video to have data in the correct order yet lack fluidity and quality due to system delays, client device processor bottlenecks, frame dropping, or other network impairments.

105. In order for playback to be fluid, the three steps claimed in the '849 Patent must be taken (*see* Exhibit 1001 ['849 Patent], cl. 1); otherwise, network bandwidth may be insufficient to deliver selected data segments, or processing and memory limitations in the decoder device may prevent the processing of media segments. Either of these occurrences will disrupt fluidity of playback regardless of sequencing or real-time transmission.

106. For example, Petitioner argues that Carmel discloses maintaining fluidity because it states that “the multimedia sequence is played back just as it was input at computer 34.” Pet., 36-37 (*quoting* Exhibit 1003 [Carmel], 10:48-54). But again, Carmel is discussing the multimedia being played back in the same *sequence* just as it was input, not *maintaining fluidly*. EX1003 [Carmel], 10:48-54 (“time stamps in the data stream are used to synchronize the data, so that the multimedia sequence is played back just as it was input at computer 34.”). The rest of the sentence from Carmel acknowledges playback will incur “a minimal necessary transmission and decoding delay” (Exhibit 1003 [Carmel], 10:48-54).

Again, this is directed to real-time aspect of the transmission and playback, not to fluidity of the playback itself. Even after decoding with minimal delay, the process of rendering the video to display can stall, or be jittery and choppy if the device lacks, *e.g.*, sufficient memory, or processing power at the time, or experiences sudden hardware or software issues. For example, if the transmission or decoding is too slow, the multimedia might be choppy or laggy when played back.

Petitioner's assumption that including time stamps in a data stream and playing back a sequence in the order it was input means the playback will maintain fluidity is not necessarily the case.

107. The Petition states that “Carmel generally teaches and repeatedly emphasizes seeking to match the bitrate/data rate of the multimedia slices with the available network bandwidth for download (and upload) so as to avoid lag and maintain fluidity.” Pet., 39-40. Carmel does not mention fluidity, let alone ***maintaining*** fluidity of playback. While the portions of Carmel that Petitioner cites mention various aspects of transmitting, receiving and sequencing multimedia data slices, none of the citations Petitioner points to discuss maintaining fluidity. Petitioner quotes Carmel at 7:35-41 that discusses ensuring that “transmission or reception is ‘keeping up’ with the input of the data” (Pet., 40 (*quoting* Exhibit 1004 [Carmel])), but that passage is discussing transmission and reception, not playback, let alone maintaining fluidity in playback. That is, Carmel is discussing matching

the “data transmission or reception rate” with the rate broadcast data is being input to the transmitting computer. *Id.* Fluidity of playback on a mobile device is a different concept than matching transmission and reception rates with the input rates. For example, buffering, which is critical for fluidity, depends on factors like the amount of processing and memory available. *See* Exhibit 1001 [’849 Patent], 3:43-45 (“The buffering and playback of multimedia objects in a synchronized fashion is critical to fluid playback.”).

108. To put this in context, Carmel is directed to “real-time broadcasting.” Exhibit 1004 [Carmel], Abstract. In Figure 2 (shown below) (which Carmel 7:35-41 is referring to), video camera 22 captures video data and feeds that data to computer 34 at a certain rate. Because Carmel is discussing a real-time, or live, broadcast (for example, of “an entertainment or sports event” (*id.*, 6:58-59)), computer 34 must transmit the video from the camera at a rate that is “keeping up” with the rate the camera is recording. *Id.*, 7:35-39. Likewise, clients 30 must be able to receive the data at a rate that keeps up with the rate the camera is recording. Otherwise, clients 30 cannot show the live event in real time. EX2015 [Polish Dep. Tr.], 60:18-23 (“[a]nd in order to stream it, what it sort of means for it to stream is that you’re keeping up with it so that you don’t have to fully download the video slower than realtime and then play it back.”).

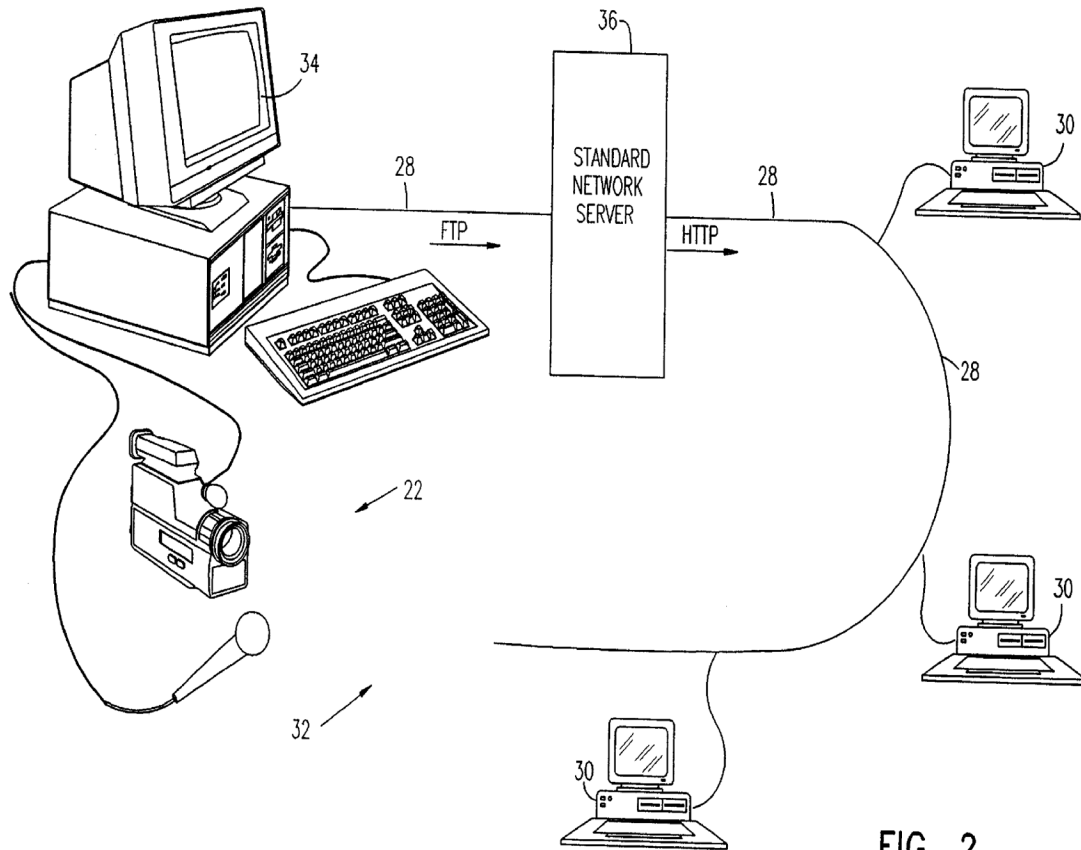


FIG. 2

109. But even if clients 30 can receive data at a rate that keeps up with the live broadcast, that does not ensure fluidity of playback at client 30. Real-time broadcasting is not a proxy for fluidity and quality. *See, e.g.,* Exhibit 2029 [Welch], 2-3 (discussing measuring jitter, packet loss, and other network impairments issues (e.g., fluidity and quality issues) on streaming services). Additional factors, like the availability of enough memory and processing power at client 30 to buffer and playback the video will determine whether the playback itself is fluid regardless of whether a video is broadcast in real-time. Similarly, the

capabilities of the multimedia player and decoder may impact fluidity of playback. Exhibit 1008 [File History], 582. Maintaining fluidity of playback is not discussed or disclosed in Carmel.

110. Petitioner argues that background knowledge of a POSITA supplies this missing limitation, arguing that “maintaining playback fluidity/continuity and the highest possible or practicable audio and video playback ... was well-known and something that those in the field generally sought to achieve” and that “A POSA would have found it obvious and would have been motivated to achieve this fundamental streaming goal of maintaining fluidity and the highest possible/practicable quality multimedia playback. (*Id.*)” Pet., 37. High quality fluid playback is a generic goal of any real-time system. But the hardware and software on mobile devices available at the time lacked the ability to fluidly play high quality video and audio. *Id.* See EX2015 [Polish Dep. Tr.], 22:24-23:3 (“I’m not aware of any products that were around [in April 2005] that would [] stream video.”). Streaming capabilities on most mobile devices at the time were rudimentary or nonexistent. EX2015 [Polish Dep. Tr.], 23:11-21 (“there were constraints in all directions ... [mobile phones] were still very expensive ... there were also big limitations in power consumption...”). While a POSITA may have understood that maintaining fluidity, video quality and audio quality were desirable, a POSITA would not understand how to maintain fluidity, video quality,

or audio quality in the claimed manner, especially given the limited capabilities of mobile devices and cellular networks in general at the time.

111. Petitioner's rationale also doesn't explain how a POSITA would come to the conclusion that fluidity should be maintained by performing the three claimed steps of (1) selecting a plurality of said multimedia objects that reflect available network bandwidth, (2) autonomously adjusting said selection and playback according to the multimedia object parameters and supplied host path identification, and (3) utilizing optimized decoding processes to maintain quality playback. Aside from the assertion that fluid playback is generally desirable, Petitioner provides no explanation for why a POSITA would know or want to use the three claimed steps to maintain fluid playback.

112. Petitioner relies on its expert declaration and extrinsic documents cited therein to support the statement that "[a] POSA would have found it obvious and would have been motivated to achieve this fundamental streaming goal of maintaining fluidity and the highest possible/practicable quality multimedia playback. (*Id.*)" Pet., 37 (*citing* Exhibit 1002 [Polish Decl.], ¶178). But none of the citations called out by Dr. Polish discuss fluidity. *Id.* Mostly, the citations discuss addressing quality issues when there is limited bandwidth or computational power available. *Id.* But while quality may impact fluidity, it is only one factor that impacts maintaining fluidity. Fluidity is the smoothness of playback, regardless of

whether any degradation of video or audio quality has occurred. *See, e.g.*, EX1001 [’849 Patent], 3:43-45 (“The buffering and playback of multimedia objects in a synchronized fashion is critical to fluid playback.”); EX1008 [FH], 582 (“Maintaining smooth quality playback, based on playback efficiency in my specification, involves other factors, and involves dynamic player executed configurations and optimized decoding, based on the parsed multimedia objects.”).

113. Moreover, nothing in Carmel teaches or suggests how to maintain fluidity, video quality and audio quality as required by the claims. While maintaining fluidity, video quality and audio quality are aspirational goals of any system, a POSITA would not have understood how to achieve these goals using the technology available at the time. *Supra*, §V.A.

114. In my opinion, the limitations here (maintaining fluidity, video quality and audio quality by performing the three claimed steps) are central to the claimed technology and involve complex and novel concepts regarding then-emerging ABR technologies. *Supra*, §V.B. Utilizing the three claimed steps was not at the time (or even today) a standardized method of maintaining fluidity that would have been common knowledge for a POSITA. *Id.* Indeed, a POSITA in April 2005 would not have understood how to stream on a mobile device as mobile devices at the time did not stream. EX2015 [Polish Dep. Tr.], 22:24-23:3. Thus, in my

opinion, it would not be background knowledge for a POSITA to maintain fluidity, video quality and audio quality by performing the three claimed steps.

115. Because Carmel does not teach or suggest maintaining fluidity as required by the independent claims, Petitioner has not shown that the claims are unpatentable.

3. Carmel And Mattavelli Do Not Teach Or Suggest “Fluidity, Video Quality and Audio Quality Are Maintained” In Accordance With The Claim Limitations.

116. Claim c.ii requires that “the multimedia player is configured to play multimedia objects in a sequence such that fluidity, video quality and audio quality are maintained by” performing all three distinct steps: (1) “selecting a plurality of said multimedia objects that reflect available network bandwidth,” (2) “autonomously adjusting said selection and playback according to the multimedia object parameters and supplied host path identification” and by (3) “utilizing optimized decoding processes to maintain quality playback.” Exhibit1001 [’849 Patent], cl. 1. I understand that each of these limitations must be taught or suggested in their entirety. That is, the alleged prior art combination must disclose or suggest that collectively performing each of these three steps to maintain fluidity, video quality and audio quality. *Id.*

117. In my opinion, Carmel and Mattavelli do not disclose this limitation. The Petition argues that the limitation “wherein the multimedia player is

configured to play multimedia objects in a sequence such that fluidity, video quality and audio quality are maintained by selecting a plurality of said multimedia objects that reflect available network bandwidth” is taught by Carmel alone. Separately, the Petition argues “utilizing optimized decoding processes to maintain quality playback” is taught by Mattavelli alone. Compare Pet., 35-40 with Petition, 45-50. But neither reference either alone or combined teaches “wherein the multimedia player is configured to play multimedia objects in a sequence such that fluidity, video quality and audio quality are maintained by ... utilizing optimized decoding processes to maintain quality playback.” That is, neither reference teaches utilizing optimized decoding processes to maintain fluidity, video quality and audio quality.

118. The Petition alleges that Mattavelli’s teachings regarding Computation Graceful Degradation (CGD) video decoding teaches or suggests “utilizing optimized decoding” and that the resulting degraded content teaches or suggests “maintaining the quality and fluidity of playback.” Pet., 48. But even assuming arguendo that CGD video decoding were an optimized decoding process, Mattavelli stresses that CGD teaches degrading video quality, not maintaining fluidity, video quality and audio quality as required by the claims:

- “The goal [of CGD] is to provide results of possibly lower visual quality ... when the required processing needs exceed the available processing resources.” Exhibit 1004 [Mattavelli], 2309.
- “The main rationale ... is to provide results of poorer quality when the results of the desirable quality cannot be obtained in real time.” *Id.*
- “When the complexity of the task exceeds the available processing power, real-time services, possibly of degraded quality, are nevertheless guaranteed respecting all real-time constraints.” *Id.*
- “In our case, the goal is to guarantee real-time video decoding with possible degradation of the image quality, i.e. reduction of the peak signal to noise ratio (PSNR), without losing [sic] parts of the image content.” *Id.*

119. Degrading video and audio quality is not maintaining video quality and audio quality. That is, the '849 Patent claims disclose three steps that operate together to maintain fluidity, video quality and audio quality during playback. Mattavelli discloses using degraded video/audio quality in response to system constraints. Put another way, the '849 Patent teaches methods for maintaining fluidity, video quality and audio quality as much as possible given different bandwidth availability. Mattavelli discloses degrading video quality when system

constraints do not allow for maintaining video quality. EX1004 [Mattavelli], 1 (“The main rationale of the Computational Graceful Degradation (CGD) approach is to provide results of poorer quality when the results of the desirable quality cannot be obtained in real time.”). These are fundamentally different disclosures with fundamentally different goals. Mattavelli teaches a decoding method with quality degradation when processing resources are constrained. Exhibit 1004 [Mattavelli], 2309. The ’849 Patent claims disclose a decoding process that maintains fluidity and quality despite limitations of the processing device. Exhibit 1001 [’849 Patent], cl. 1.

120. Moreover, nothing in Mattavelli teaches or suggests using CGD to maintain fluidity. While the Petition argues that Mattavelli’ CGD decoding “ensure[s] that the fluidity or real-time continuity of the playback is maintained” (Pet. 46), nothing Petitioner cites from Mattavelli reflects maintaining fluidity. As with Carmel, the terms “fluid” and “fluidity” are completely missing from Mattavelli. Exhibit 1004 [Mattavelli]. Real-time decoding, by itself, is not sufficient to maintain fluid playback. For example, adequate buffering and playback in a synchronized fashion are also critical to maintain fluid playback. Exhibit 1001 [’849 Patent], 3:43-45. Mattavelli does not discuss either buffering or synchronized playback.

121. To the contrary, the portions of Mattavelli Petitioner cites uniformly indicate that Mattavelli’s solution is to degrade service in response to limitations on processing power. Pet. 46 (*quoting* Exhibit 1004 [Mattavelli], 2309 and 2312.) These passages state “The main rationale ... is to provide results of poorer quality when the results of the desirable quality cannot be obtained in real time” (*id.*, 2309) and, “[o]bviously, the implementation of CGD features are not proposed to be used at their maximum degradation rate but as [a] tool able to guarantee real-time performance in [the] presence of peaks of decoding complexity or as a way to ease the scheduling problems given by temporary fluctuations of the available processing power” (*Id.*, 2312). It is evident from these quotes that Mattavelli is concerned with real-time, not fluidity.

122. Moreover, both quotes confirm that Mattavelli is intentionally degrading video quality rather than attempting to maintain fluidity, video quality and audio quality as required by the claims. Degraded service is not maintaining fluidity; indeed, degraded service often results in *lower* fluidity. As with Carmel, Mattavelli does not address maintaining fluidity.

4. Mattavelli Does Not Teach Or Suggest “To Maintain Quality Playback” (limitation 1[c.iv])

123. The Petition relies on Mattavelli alone for this limitation and the corresponding limitations of claims 6 and 7. Pet., 45-50, 65-67. The Petition argues

that “Mattavelli teaches CGD methods where degraded, less computationally intensive algorithms and processes for decoding compressed multimedia data are used during periods where the decoding processing needs exceed the available processing resources, where the visual quality of the video output is possibly temporarily degraded to ensure that the fluidity or real-time continuity of the playback is maintained.” Pet., 46. As discussed above, Mattavelli’s CGD methods degrade visual quality of the video rather than maintaining it. *Supra*, §VII.B.

124. Mattavelli does not discuss playback. Real-time decoding does not imply that quality has been maintained. Maintaining quality playback in the claims relates to optimized decoding processes.. EX1001 [’849 Patent], cl. 1. A real-time transmission may be choppy or freeze, or the video or audio quality itself may be poor. For example, live sports broadcasts sometimes freeze or skip frames due to, among other things, network impairments. In these cases, the transmission may be in real-time, but maintaining quality playback of fluidity, video and audio are not maintained. *Id.*

125. The Petition argues that “Mattavelli teaches that there are several decoding processes that can be simplified to save computational resources.” Pet., 47 (citing EX1003 [Mattavelli], 2309-2310. But Mattavelli describes these decoding processes as “possibly leading to imprecise or degraded video results.” EX1003 [Mattavelli], 2310. Mattavelli’s decoding processes do not disclose or

suggest the decoding processes in a way that would maintain quality playback as required by the claims; instead, they degrade quality playback.

C. Carmel and Wang Do Not Teach Or Suggest The Challenged Claims (Ground 2)

126. Ground 2 “incorporates Ground 1’s analysis of Carmel’s teachings and “adds Wang’s teachings for claim elements 1[a.i], 1[b.ii], 1[c.iv] (and the corresponding elements recited in independent claims 6 and 7) and dependent claims 3, 4, 5, 8 and 9.” Pet., 70. For the reasons discussed above (*supra*, §VIII.B.2-3), Carmel does not teach or suggest limitation 1[c.ii] or the corresponding limitations 6[c.ii] and 7[c.ii] in independent claims 6 and 7. The Petition does not allege Wang discloses these limitations. Pet., 70-75. Thus, Carmel in view of Wang fails to teach or suggest the challenged claims.

127. Carmel in view of Wang also does not teach or suggest the challenged claims for the reasons discussed below.

1. Carmel And Wang Do Not Teach Or Suggest “Utilizing Optimized Decoding Processes To Maintain Quality Playback.”

128. In my opinion, the combination of Carmel and Wang does not teach or suggest “utilizing optimized decoding processes to maintain quality playback.”

129. The Petition alleges that Carmel in view of Wang teaches “utilizing optimized decoding processes to maintain quality playback.” (claim element 1[c.iv]) and the corresponding limitations in claims 6 and 7. *See* Pet. At 70, 72-73.

130. Petitioner’s argument that Carmel and Wang discloses the “utilizing optimized decoding processes to maintain quality playback” is shown below:

Wang teaches a “platform-based MPEG-4 Advanced Video Coding (AVC) decoder” that optimizes the decoding hardware and software so that resource-constrained mobile devices can decode MPEG-4 AVC encoded data fast enough to utilize this compression standard and benefit from the higher image quality it can provide. (Wang, 51.) Wang provides that to address constraints from “the low computation power and small memory for mobile devices” it adopts a “platform[-] based design method to increase overall throughput.” (*Id.*) Wang repeatedly states that its proposed decoder has “optimized” the decoding processes that it uses to achieve this goal of increased throughput/decoding speed of the AVC codec. *E.g.*, Wang 51 (“[W]e optimize the decoder software by enhancing the frame buffer management, boundary padding, and content aware inverse transform.”), 52 (describing “an optimized AVC decoder”), 53-54 (“Software Optimization” section 4.3.) Accordingly, Carmel in view of Wang teaches and renders obvious utilizing optimized decoding processes to maintain quality playback. (Polish, ¶¶279-281.)

Pet. at 72-73.

131. In my opinion, Petitioner’s argument does not show that the claims are unpatentable. For ground 2, Petitioner does not contend that Carmel discloses “optimized decoding processes” that “maintain quality playback.” Rather, Petitioner relies on Wang alone for these elements. *Id.* at 70, 72-73.

132. In my opinion, the Petition does not demonstrate that Wang discloses “utilizing optimized decoding processes to maintain quality playback.” Setting aside whether Wang’s platform-based decoder is an “optimized decoding process,” Wang does not disclose “utilizing optimized decoding processes to maintain quality playback,” as required by the claim. Petitioner does not attempt to identify any teachings in Wang related to maintaining quality playback. Instead, Wang’s decoder is intended to improve throughput, not maintain quality playback. *See* Exhibit 1007 [Wang], 51 (“Overall decoding throughput is increased by synchronizing the software and the dedicated co-processors”); 51 (“platform [-] based design method ***to increase overall throughput***”); 53 (“To ... maximize the throughput ...”). Petitioner never contends that improving throughput is equivalent to maintaining quality playback.

133. In my opinion, it is not equivalent. While improving throughput or decoding speed is one factor that can help maintain quality playback, it does not automatically correlate to maintaining quality playback. Other factors, like processing power, multimedia player configuration, and decoding efficiency would

also contribute. EX1008 [FH], 582. Moreover, the claims are not concerned with improving throughput or decoding speed. Instead, the claims select “a plurality of said multimedia objects that reflect available network bandwidth” and then “utilize optimized decoding processes to maintain quality playback” given the available bandwidth. Wang is not concerned with selecting a differently encoded stream in order to maintain quality playback for a given network bandwidth. Instead, Wang simply defines a standards-based AVC decoder that allegedly performs better than existing AVC decoders. Exhibit 1007 [Wang], 2 (“In this paper, we adopt a platform based design methodology to construct an optimized AVC decoder”). Because Ground 2 of the Petition does not address “to maintain quality playback,” in my opinion, the Petition has not shown that Carmel and Wang teach or suggest this limitation.

134. Wang itself does not indicate that its platform-based decoder “maintain[s] quality playback.” Wang consistently explains that the decoder attempts to increase throughput. *See, e.g.*, Exhibit 1007 [Wang] at 51 (“With this methodology, we jointly optimize the software and hardware design of the decoder. ***Overall decoding throughput is increased*** by synchronizing the software and the dedicated co-processors.”) (emphasis added), 51 (“With the new dedicated accelerators, ***the decoding throughput is increased*** by about 30% to reach 6.6 fps on the average and is up to 10.3 fps for slow motion video sequences.”) (emphasis

added), 54 (“Fig. 7 (b) shows the decoding throughput improvement”), 54 (“The application specific circuit design methodology includes the task partitioning and scheduling in the MB-level to *enhance the overall decoding throughput.*”).

(emphasis added). The only time Wang even mentions “quality” is in the introduction in relation to MPEG-4 Advanced Video Coding (*see id.* at 1)—“quality” is never discussed in relation to Wang’s decoder, let alone that the decoder “maintains quality playback,” as claimed. Because Wang does not disclose “to maintain quality playback” and the Petition does not argue otherwise, Ground 2 fails.

135. In my opinion the Carmel and Wang combination fails to disclose other limitations of claim 1. As explained above, the “utilizing optimized decoding processes” limitation in claim 1 is one of three necessary operations controlled by the multimedia player “*such that fluidity, video quality and audio quality are maintained.*” *See supra*, §VIII.B.3. Thus, even if Wang’s platform-based decoder met the “optimized decoding processes to maintain quality playback” limitation, Wang’s decoder still must be used in the Carmel-Wang combination to maintain “fluidity, video quality and audio quality.” But as explained above, Wang’s decoder does not maintain video quality—it attempts to improve throughput and decoding speed. Moreover, Wang does not disclose audio decoding processes, so likewise does not maintain audio quality. While improving throughput and

decoding speed might help maintain fluidity, they are not the only factors that impact fluidity and they do not guarantee maintaining fluidity. Nor does Wang discuss or disclose maintaining fluidity. Thus, the Carmel-Wang combination cannot meet the “fluidity, video quality and audio quality are maintained” limitation of claim 1.

136. The Petition’s argument for this limitation in Ground 2 is insufficient to demonstrate a reasonable likelihood of invalidating any of the challenged claims. Carmel and Wang do not teach or suggest the “optimized decoding processes to maintain quality playback” limitation of claim 1. Petitioner does not argue Carmel teaches this limitation. And Wang’s platform-based decoder does not “utiliz[e] optimized decoding processes to maintain quality playback.” These deficiencies are fatal to Petitioner’s Ground 2.

2. A POSITA would not have been motivated to combine Carmel and Wang

137. In my opinion, a POSITA would not have been motivated to combine the teachings of Carmel and Wang as done by Petition for Ground 2.

138. Carmel relates to systems for real-time multimedia broadcasting over a network. Exhibit 1003 [Carmel], 1:11-13. Carmel’s goal is to allow Internet service providers to provide “real-time broadcasting” “to their general clientele.” *Id.*, 1:43-47. Carmel seeks to implement media streaming over existing client

hardware and software. According to Carmel, an object of the invention is to “provide substantially continuous, high-bandwidth data streaming over a network using common, existing server and network infrastructure.” *Id.* at 1:51-54. Clients in Carmel’s system “preferably comprise conventional personal computers or workstations.” *Id.*, 6:38-40.

139. By contrast, Wang does not seek to improve data streaming using existing infrastructure and conventional personal computers or workstations. Wang relates to a platform-based “prototype” decoder that relies on improved hardware and software. Exhibit 1007 [Wang], 51. Wang’s solution requires “jointly optimiz[ing] the software and hardware design of the decoder.” Exhibit 1007 [Wang], 51. It introduces a new “ARM platform based MPEG-4 AVC decoder architecture.” Exhibit 1007 [Wang], 52. *See id.*, Fig. 2 (showing a block diagram of the proposed decoder architecture) That is, Wang is proposing a prototype hardware and software architecture that improves throughput over then-existing client hardware and software architecture.

140. In my opinion, Petitioner’s proposed Carmel-Wang combination is fundamentally incompatible with the teachings and goals of Carmel. A POSITA would recognize that incorporating Wang’s hardware-dependent prototype decoder into Carmel’s system would defeat one of the primary purposes of Carmel—

namely, enabling seamless streaming to diverse client devices (*i.e.*, “**conventional** personal computers or workstations”). Exhibit 1003 [Carmel], 6:38-40.

141. In my opinion, an ordinarily skilled artisan would not look to modify Carmel’s system for broadly compatible streaming over common infrastructure by requiring an ISP’s “general clientele” (e.g., the general public) to obtain and install Wang’s specific platform-based prototype decoder in order to receive streamed multimedia. Petitioner’s assertion that Wang’s “optimized decoding software and hardware design to decode AVC-encoded data” (Pet., 76) could simply be integrated into client devices in Carmel’s system ignores the realities of what the references teach and the goals and purposes of each. Carmel is directed to improving the **transmission** of real-time broadcasting. *See, e.g.*, Exhibit 1003 [Carmel], Abstract (“A method for real-time broadcasting from a transmitting computer to one or more client computers over a network...”), cl. 1 (same). Carmel does not and cannot control the “conventional personal computers or workstations” that are used by clients to decode those transmissions. *Id.*, 6:38-40. Wang on the other hand is directed to an improved hardware and software decoder at the client devices. Implementing Wang’s decoder in Carmel would require upgrading each client’s personal computer or workstation to include the improved decoder hardware and software. That is, every customer of Carmel’s Internet service provider would have to buy new hardware with Wang’s prototype decoder

architecture. A POSITA would not consider this a realistic solution to the problems Carmel seeks to solve. The Petition's arguments thus fail to articulate any reasoned basis why such a combination would have been desirable or obvious at the time of the invention.

D. Grounds 3-5

142. For the reasons described above (*supra*, §VIII.B-C), in my opinion, Grounds 1 and 2 fail to teach or suggest any of the independent claims. As discussed below, Grounds 3-5 fail to remedy the deficiencies described above for Grounds 1 and 2.

1. Ground 3

143. Ground 3 relies on Wolters (Ex. 1041) to supply claim element 1[c.iv], which requires “utilizing optimized decoding processes.” Pet. 78. The Petition contends that Wolters's discussion of High-Efficiency MPEG Advanced Audio Coding (“HE-AAC”) discloses such an optimized audio decoding process. *Id.* at 78–80. Wolters, however, expressly teaches that HE-AAC exists in two materially distinct variants, High-Quality (“HQ”) and Low-Power (“LP”), with opposing tradeoffs between audio quality and computational complexity. Exhibit 1041 [Wolters], 13. In my opinion, neither variant satisfies the claims, nor does Wolters cure the deficiencies of Carmel and Wang.

144. Wolters explains that the HQ variant “offers better audio quality at the cost of greater computational complexity,” while the LP variant “results in a reduced audio quality but also requires less computational resources for both memory and complexity.” Exhibit 1041 [Wolters], 13. These distinctions are fatal to the Petition’s theory.

145. First, the Petition does not explain how HE-AAC LP could maintain audio quality, as expressly required by the claims. *See* Pet. 78–80. To the contrary, Wolters states that the LP variant reduces audio quality. Exhibit 1041 [Wolters], 13. Nor does the Petition identify anything in Wolters that addresses maintaining fluidity or video quality, both of which are also required by claim element 1[c]. Accordingly, adding Wolters in Ground 3 does not remedy the same failure present in Ground 2, namely the absence of any disclosure that “fluidity, video quality, and audio quality are maintained by ... utilizing optimized decoding processes to maintain quality playback.” Because Wolters expressly teaches a reduction in audio quality under its low-power mode, it affirmatively contradicts, rather than satisfies, the claim requirement.

146. Second, a person of ordinary skill in the art (“POSITA”) in April 2005 would not have implemented HE-AAC HQ in the mobile context addressed by the ’849 Patent. Wolters makes clear that the HQ variant achieves higher audio quality only by incurring “greater computational complexity.” Exhibit 1041 [Wolters], 13.

That teaching is incompatible with the '849 Patent's core premise and repeated disclosures concerning the severe processing constraints of mobile devices. See, e.g., Exhibit 1001 ['849 Patent], 1:51–52 (noting that “audio codecs like AAC require multiple parallel processes and fast processing”); 2:13–15 (explaining that although Java decoders existed for MP3 ringtones, “no Java players are known that will play AAC”); 4:50–54 (stating that Java “cannot take advantage of hardware capabilities in processing the huge number of calculations and variables required for either MPEG4 decoding or AAC decoding on limited processing mobile handset”).

147. In my opinion, Wolters reinforces this incompatibility. It explains that HE-AAC HQ decoding relies on “a complex representation of the subband samples” with computations performed using complex values, Exhibit 1041 [Wolters], 6, and further requires portions of the decoder to be implemented using double-precision arithmetic. *Id.* at 13. The '849 Patent, by contrast, expressly observes that typical mobile processors “have integer math only,” underscoring the absence of hardware support for such operations in the relevant time frame. Exhibit 1001 ['849 Patent], 10:26-28. HE-AAC therefore demands substantially more processing power than MPEG-4 Audio in a manner inconsistent with mobile streaming systems of the era.

148. Thus, Wolters is not a suitable reference for claim element 1[c.iv]. Its LP variant fails to maintain audio quality, while its HQ variant requires computational resources that the '849 Patent expressly identifies as unavailable on mobile devices. Because HE-AAC is incompatible with the mobile decoding constraints that define the claimed invention, a POSITA would not have combined Wolters with Carmel and Wang.

2. Grounds 4 and 5

149. The Petition relies on Guo (Exhibit 1051) in Ground 4 and 5 for its alleged teachings regarding “the use of multiple servers to serve multimedia segments” (claim element 1[b.ii]). Pet., 80, 86. The Petition relies on Yu (Exhibit 1061) in Grounds 4 and 5 for dependent claims 3 and 8. *Id.* The Petition relies on Forecast (Exhibit 1016) in Grounds 4 and 5 for dependent claims 4 and 5. None of these additions remedy the failure of Carmel, Mattavelli and Wang to teach or suggest the independent claims as discussed above for Grounds 1 and 2. *Supra*, §VIII.B-C. Thus, in my opinion, Grounds 4 and 5 also fail.

IX. CONCLUSION

150. I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine

or imprisonment, or both, under Section 1001 of Title 18 of the United States
Code.

Dated: January 23, 2026

By: 

Matthew Goldman