

**IN THE UNITED STATES PATENT AND TRADEMARK
OFFICE**

BEFORE THE PATENT TRIAL AND APPEAL BOARD

CISCO SYSTEMS, INC.
Petitioner,

v.

REALTIME ADAPTIVE STREAMING, LLC
Patent Owner.

Case: IPR2018-01384
U.S. Patent No. 8,934,535

**DECLARATION OF JOSEPH P. HAVLICEK, PH.D. IN
SUPPORT OF PETITION FOR *INTER PARTES* REVIEW OF
CLAIMS 1-6, 8-12, 14-17, 19, 21, 22, AND 24 OF U.S. PATENT
NO. 8,934,535**

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PETITIONER’S EXHIBIT LIST

EX. NO.	BRIEF DESCRIPTION
1001	U.S. Patent No. 8,934,535 to Fallon <i>et al.</i>
1002	Declaration of Joseph P. Havlicek, Ph.D.
1003	Curriculum Vitae of Joseph P. Havlicek, Ph.D
1004	United States Provisional Application No. 60/268,394 (filed Feb. 13, 2001)
1005	File History for U.S. Patent No. 8,934,535
1006	U.S. Patent No. 6,309,424 to Fallon
1007	U.S. Patent No. 6,557,001 to Dvir et al. (“Dvir”)
1008	Iskender Agi & Li Gong, <i>An Empirical Study of Secure MPEG Video Transmissions</i> , Proc. of the 1996 Symposium on Network and Distributed Systems Security, IEEE (1996).
1009	Ke Shen, <i>A Study of Real-Time and Rate Scalable Image and Video Compression</i> , Purdue Univ. Thesis (Dec. 1997).
1010	Ke Shen & E. Delp, <i>Parallel Approaches to Real-Time MPEG Video Compression</i> , ICPP, Vol. 2 (1996).
1011	Rahul Garg, <i>Methods for Matching Compressed Video to ATM Networks</i> (1998).
1012	Krasmit Kolarov, et al., <i>Low Complexity Real-time Video Encoding for Soft Set-Top Box Platforms</i> , Technical Program of the Cable 2K Conf. (May 2000)
1013	U.S. Patent No. 5,845,083 to Hamadani et al. (“Hamadani”)
1014	U.S. Patent No. 6,195,024 to Fallon
1015	Memorandum Opinion and Order, <i>Realtime Data, LLC v. Actian Corp.</i> , No. 6:15-cv-463 (E.D. Tex.) (dated Jul. 28, 2016)

1016	Mark Nelson, <i>The Data Compression Book</i> (1992)
1017	John Watkinson, <i>The MPEG Handbook: MPEG-1 MPEG 2 MPEG-4</i> (Focal Press 2001) (excerpts)
1018	IBM Dictionary of Computing, 269 (“file”) (1994 McGraw-Hill)
1019	John Morris, MPEG-2: The Main Profile, Chapter 3.11 in <i>Circuits and Systems Tutorials</i> , IEEE Press (1995)
1020	U.S. Patent No. 7,257,158 to Figueredo et al. (“Figueredo”)
1021	U.S. Patent No. 5,675,789 to Ishii et al. (“Ishii”)
1022	U.S. Patent No. 5,990,955 to Koz (“Koz”)
1023	U.S. Patent No. 4,467,317
1024	U.S. Patent No. 4,652,856
1025	U.S. Patent No. 4,122,440
1026	U.S. Patent No. 6,341,196 to Ando et al. (“Ando”)

1. I, Joseph P. Havlicek, Ph.D., hereby declare under penalty of perjury:

I. BACKGROUND AND QUALIFICATIONS

2. I have been retained on behalf of Cisco Systems, Inc. to provide my opinions regarding the validity of claims 1-6, 8-12, 14-17, 19, 21, 22, and 24 of U.S. Patent No. 8,934,535 (“535 Patent”).

3. Ex. 1003 is a true and correct copy of my Curriculum Vitae. This document provides further details about my background and experience.

A. Educational Background

4. I received a Bachelor of Science degree in electrical engineering with minors in mathematics and computer science from Virginia Tech in 1986. I also received a Master of Science Degree in electrical engineering, also from Virginia Tech, in 1988. I received my Ph.D. in Electrical and Computer Engineering from the University of Texas at Austin in 1996. My Ph.D. research was in the field of image processing.

B. Professional Experience

5. From December 1984 to May 1987, I was a software engineer at Management Systems Laboratories, Blacksburg, VA. My job responsibilities included developing software for nuclear materials management under contract with the United States Department of Energy.

6. From June 1987 to January 1997 I was an electrical engineer at the United States Naval Research Laboratory. For the period of June 1987 through

August 1989, I was an on-site contractor affiliated with SFA, Inc, Landover, Maryland. From August 1989 through January 1997, I was a federal government employee. I was on leave without pay from August 1987 through July 1988 while completing my Master of Science degree. I was also on leave without pay for much of the period from August 1990 through January 1997 while I completed my Ph.D. degree. My main job responsibilities at the United States Naval Research Laboratory included designing digital and analog circuits to process real-time video signals and designing and implementing target detection, tracking, and identification algorithms for real-time video signals. I was a recipient of the 1990 Department of the Navy Award of Merit for Group Achievement for this work.

7. From January 1993 through December 1993 I was an on-site contractor at International Business Machines (IBM) Corporation, Austin, TX. My main job responsibilities included designing and implementing image compression and decompression algorithms (CODECs) for IBM products.

8. Since January 1997, I have been a regular faculty member in the School of Electrical and Computer Engineering at the University of Oklahoma, Norman, OK. I was an Assistant Professor from January 1997 through June 2002. I was promoted to the rank of Associate Professor and granted tenure in July 2002. I was promoted to the rank of Professor in July 2007. I was appointed to the Williams Companies Foundation Presidential Professorship from April 2009 through April

2017. In April 2017 I was appointed to the Gerald Tuma Presidential Professorship. My main job responsibilities at the University of Oklahoma include conducting academic research in electrical and computer engineering, teaching graduate and undergraduate courses in electrical and computer engineering, and performing professional and institutional service.

9. For over 20 years, I have conducted research and taught classes in the field of image and video processing and analysis. My main scholarly contributions have been in the areas of modulation domain image models and image processing (AM-FM image models), video target tracking, and distributed control of video networks for intelligent transportation systems. I have supervised or co-supervised 10 Ph.D. students to completion and 24 M.S. students to completion.

10. I am co-founder and director of the University of Oklahoma Center for Intelligent Transportation Systems (CITS). Under my supervision, the Center has collaborated with the Oklahoma Department of Transportation since 1998 to design and implement the Oklahoma Statewide Intelligent Transportation System, including a geographically distributed video network that is currently deployed on major highways and interstates across the entire State of Oklahoma.

11. I teach a variety of courses at the University of Oklahoma, including the required junior-level Signals and Systems course ECE 3793 (taught 21 times),

the graduate level Digital Image Processing course ECE 5273 (taught 19 times), and the graduate level Digital Signal Processing course ECE 5213 (taught 12 times).

12. Since joining the University of Oklahoma in January 1997, I have been Principal Investigator or Co-Principal Investigator on over 90 externally funded grants and contracts with a total value of over \$18.4M. My main research contributions have been in the areas of signal, image, and video processing, video target tracking, and intelligent transportation systems. I have been author or coauthor on over 120 scholarly publications in these areas. I was a recipient of the 1990 Department of the Navy Award of Merit for Group Achievement for my work in video target tracking. My research group at the University of Oklahoma originated the Virtual Traffic Management Center concept featured in a December 2014 FHWA technical report (Guidelines for Virtual Transportation Management Center Development) and a November 2014 FHWA national webinar with the same title. I have received a number of teaching awards, including the University of Oklahoma College of Engineering Outstanding Faculty Advisor Award (2005-2006) and the University of Texas Engineering Foundation Award for Exemplary Engineering Teaching while Pursuing a Graduate Degree (1992).

13. Since joining the faculty of the University of Oklahoma in 1997, I have taught numerous classes at both the graduate and undergraduate levels. At the graduate level, I have taught the following courses: Digital Signal Processing (ECE

5213), Digital Image Processing (ECE 5273 and CS 5273), Multimedia Communications (ECE 5973), Kalman Filtering (ECE 6973), and Advanced Image Processing (ECE 6283). At the undergraduate level, I have taught the following courses: Digital Signals and Filtering (ECE 2713), Microcomputer System Design (ECE 3223), Signals and Systems (ECE 3793), Digital Signal Processing (ECE 4213), Digital Image Processing (ECE 4973), and Multimedia Communications (ECE 4973).

C. Publications

14. A listing of my publications is found in my curriculum vitae in Ex. 1003.

15. I have published numerous peer reviewed book chapters, journal articles, and conference papers, including 9 book chapters, 22 journal articles, and 97 conference papers; the following are representative:

16. E. Vorakitolan, J.P. Havlicek, R.D. Barnes, and A.R. Stevenson, "Simple, Effective Rate Control for Video Distribution in Heterogeneous Intelligent Transportation System Networks," in Proc. IEEE Southwest Symp. Image Anal. & Interp., San Diego, CA, Apr. 6-8, 2014, pp. 37-40

17. V. DeBrunner, J.P. Havlicek, T. Przebinda, and M. Ozaydin, "Entropy-Based Uncertainty Measures for $L_2(\mathbb{R}^n)$, $l_2(Z)$, and $l_2(Z/NZ)$ with a Hirschman

Optimal Transform for $\mathbb{Z}(Z/NZ)$,” IEEE Trans. Signal Process., vol. 53, no. 8, pp. 2690-2699, Aug. 2005.

18. A.C. Bovik, J.P. Havlicek, M.D. Desai, and D.S. Harding, “Limits on Discrete Modulated Signals,” IEEE Trans. Signal Process., vol. 45, no. 4, pp. 867-879, Apr. 1997.

19. J.P. Havlicek and A.C. Bovik, “Image Modulation Models,” in Handbook of Image and Video Processing, A.C. Bovik, ed., Communications, Networking, and Multimedia Series by Academic Press, San Diego, 2000, pp. 305-316.

20. J.P. Havlicek, C.T. Nguyen, G. Fan, and V.B. Venkataraman, “Integration of a dualband IR data acquisition system using low-cost PV320 cameras,” in Infrared Technology and Applications XXXII, B.F. Andersen, G.F. Fulop, and P.R. Norton, ed., SPIE v. 6206, May 18, 2006, pp. 62061U-1 – 62061U-9.

21. O. Alkhoul, V. DeBrunner, and J. Havlicek, “Hirschman Optimal Transform (HOT) DFT Block LMS Algorithm,” in Adaptive Filtering, L. Garcia, ed., ISBN: 978-953-307-158-9, InTech, Sep. 2011, pp. 135-152.

D. Other Relevant Qualifications

22. I am a member of several professional societies and organizations, including the Institute of Electrical and Electronics Engineers (IEEE), the IEEE

Signal Processing Society, the IEEE Computer Society, and the IEEE Intelligent Transportation Society. I am a Senior Member of the IEEE. From November 2015 through February 2018 I served as a Senior Area Editor for the IEEE Transactions on Image Processing. I was formerly an Associate Editor for the IEEE Transactions on Image Processing from December 2010 through October 2015. I have served as a Technical Area Chair in for the IEEE International Conference on Image Processing in the area of Image & Video Analysis, Synthesis, and Retrieval (2012, 2013) and have served on the organizing committee of that conference (2007). I have also served as a Technical Area Chair for the IEEE International Conference on Acoustics, Speech, and Signal Processing in the area of Image, Video, and Multidimensional Signal Processing (2012-2014).

23. I have served as a supervisor or committee member for numerous Ph.D. dissertations and Master's theses. I have supervised 10 Ph.D. students and am currently supervising three Ph.D. students. I have been a member of 52 additional Ph.D. dissertation committees. I have supervised 24 Master's students and am currently supervising one Master's students. I have been a member of 63 additional Master's thesis committees. A listing of my Ph.D. and Master's supervisions and committee memberships is found in my curriculum vitae in Ex. 1003.

24. I am being compensated for my services and reimbursed for reasonable expenses that I may incur while working on this matter. I have no financial interest

in the outcome of this matter or on the pending litigation between Cisco and Realtime Adaptive Streaming LLC (“Realtime”). This compensation does not depend in any way on the conclusions I reach.

II. MATERIALS CONSIDERED

25. In developing my opinions below relating to the ’535 patent, I have considered the materials cited herein, including those itemized in the “Petitioner’s Exhibit List” preceding this declaration.

III. LEVEL OF ORDINARY SKILL IN THE ART

26. I have been asked to provide my opinions regarding the knowledge and understanding of a person of ordinary skill in the art or “POSITA” as of February 13, 2001, which I understand to be the earliest claimed effective filing date of the ’535 patent. I have not evaluated whether the challenged claims of the ’535 patent are entitled to an effective filing date of February 13, 2001.

27. I understand that the factors considered in determining the ordinary level of skill in the art include: (i) the levels of education and experience of persons working in the field; (ii) the types of problems encountered in the field; and (iii) the sophistication of the technology. I understand that a person of ordinary skill in the art is not a specific real individual, but rather a hypothetical individual having the qualities reflected by the factors above. This hypothetical person has knowledge of all prior art in the relevant field as if it were arranged on a workshop wall and takes

from each reference what it would teach to a person having the skills of a person of ordinary skill in the art.

28. In my opinion, the field of art relevant to the '535 patent is primarily related to methods for selecting various data compression tools to apply to compress data.

A. Qualification of a Person of Ordinary Skill in the Art

29. In my opinion, a person of ordinary skill in the art as of February 13, 2001, would have had a minimum of: (i) a bachelor's degree in computer science, computer engineering, electrical and computer engineering, electrical engineering, or electronics; and (ii) four years of experience working with data compression; or (2) a graduate degree focusing in the field of data compression and two years of experience working with data compression. Individuals with additional education or additional industrial experience could still be of ordinary skill in the art if that additional aspect compensates for a deficit in one of the other aspects of the requirements stated above.

30. Based on my knowledge and experience in the industry, including teaching data compression techniques and in my time at IBM developing data compression tools, these qualifications would have led to familiarity with data compression systems in general and, more specifically, data compression and decompression techniques that can be associated with various data types.

31. My opinions are further supported by my education, including studies related to data compression techniques and applications, as well as by the technical training that would be required to reduce to practice the system described in the '535 patent, the relevant prior art identified in the exhibit list at the front of this declaration, and my reading of the '535 patent.

32. I understand that a person of ordinary skill in the art is presumed to have knowledge of all relevant prior art. Therefore, a person of ordinary skill in the art would have been familiar with each of the references cited herein and the full range of teachings they contain. A person of ordinary skill in the art would have reviewed the various publications and patents I discuss herein at least because these prior art references address solutions to problems in data compression.

33. I have been informed that the claims of the '535 patent are entitled to an effective filing date no earlier than February 13, 2001. Accordingly, the analysis set forth herein is based on the timeframe of the alleged invention being February 13, 2001. In February 2001, I would have qualified for or exceeded the level of skill required by the above definition of a POSITA. When I refer to the understanding of a person of ordinary skill in the art, I am referring to the understanding of a person of ordinary skill in the art as of this effective filing date.

B. The Knowledge Held By a Person of Ordinary Skill in the Art

1. Many Compression Algorithms, Including Video Compression Algorithms, Were Known

34. “In general, data compression consists of taking a stream of symbols and transforming them into codes[, where] the resulting stream of codes [is] smaller than the original symbols.” Ex. 1016 at p.14. By February 2001, those skilled in the art were aware of a variety of data compression techniques, principles, methods, and systems. Modern data compression algorithms were conceived in the 1940s, and “this early work [] was being done before the advent of the modern digital computer.” *Id* at p.29.

35. The first wave of compression algorithms included the Shannon-Fano algorithm (developed by Claude Shannon at Bell Laboratories and R.M. Fano at the Massachusetts Institute of Technology in the late 1940s) and the Huffman Algorithm (introduced by D.A. Huffman in a 1952 paper). *Id* at pp.15-18, 29. Both of those algorithms relied on determining a frequency of occurrence of particular symbols in a stream, assigning shorter codes to symbols with higher frequencies, and assigning longer codes to symbols with lower frequencies. *See id* at p.18 and p. 29.

36. By February 2001, those skilled in the art knew about the efficiency of the Huffman algorithm and heavily used that algorithm. *See id.* at p. 18. For example, Huffman coding was used as part of the JPEG standard for image compression. *See* Ex. 1022 at 2:2-7. Moreover, the video compression algorithms

in the MPEG-1 and MPEG-2 algorithms used the Huffman algorithm for, e.g., intracoding. *See id.* at 2:2-9; Ex. 1017 at p. 259.

37. By February 2001, those skilled in the art also knew about alternatives to Huffman coding such as arithmetic coding. Ex. 1016 at pp. 18-19. In arithmetic coding, instead of replacing individual input symbols with codes (as the Shannon-Fano and Huffman algorithms do), the compressor replaces a stream of input symbols with a single floating point output number. *Id.* By the 1980s, arithmetic coding techniques were the subject of numerous patents, including U.S. Patent Nos. 4,467,317, 4,652,856, and 4,122,440. *See, e.g.,* Ex. 1023-1025.

38. By February 2001, those skilled in the art also knew about various video compression algorithms. For example, the International Standards Organization had released at least two Moving Picture Experts Group standards well before February 2001 (namely MPEG-1 and MPEG-2). Ex. 1017 at pp.4-5. The MPEG-1 standard enabled storing video and audio data on a compact disc (CD). *Id.* at p.4. The MPEG-2 standard was broader in scope and enabled, among other things, compression of interlaced and high-definition video as well as broadcast of compressed video data over a communication channel. *Id.*

39. The MPEG-2 standard included a collection of compression algorithms known as profiles, each of which had a different complexity. *Id.* at p.20. Each profile in MPEG-2 is a compression algorithm that enables a particular range of

“picture size[s] or resolution[s],” known as levels. *Id.* “Not all [l]evels are supported at all [p]rofiles,” as more complex profiles typically enabled a wider range of levels. *Id.* The table below illustrates which MPEG-2 profiles enable which levels. *See id.*

		Profiles					
		Simple	Main	4:2:2	SNR	Spatial	High
Levels	High		4:2:0 1920 × 1152 90 Mb/S				4:2:0 or 4:2:2 1920 × 1152 100 Mb/S
	High 1440		4:2:0 1440 × 1152 60 Mb/S			4:2:0 1440 × 1152 60 Mb/S	4:2:0 or 4:2:2 1440 × 1152 80 Mb/S
	Main	4:2:0 720 × 576 15 Mb/S NO B	4:2:0 720 × 576 15 Mb/S	4:2:2 720 × 608 50 Mb/S	4:2:0 720 × 576 15 Mb/S		4:2:0 or 4:2:2 720 × 576 20 Mb/S
	Low		4:2:0 352 × 288 4 Mb/S		4:2:0 352 × 288 4 Mb/S		

Figure 1.12 Profiles and Levels in MPEG-2. See text for details.

Ex. 1017 at p.20.

2. MPEG Encoding Techniques Were “Notoriously Asymmetric”

40. By February 2001, those skilled in the art understood that the MPEG-1 and MPEG-2 standards defined asymmetric data compression algorithms and had been described as being “notoriously asymmetric.” *See* Ex. 1010 at p. 7. The asymmetric nature of MPEG encoding was well known to those skilled in the art—MPEG encoders were much more complex than MPEG decoders. *See, e.g.,* Ex. 1008 at p.1 (“MPEG uses an asymmetric coding model where encoding requires substantially more computational power than decoding.”); Ex. 1009 at p.4 (“the MPEG algorithm is notoriously asymmetric”); Ex. 1011 at p.1 (“MPEG is a highly

asymmetric codec.”); Ex. 1012 at p.1 (“MPEG is asymmetric”); Ex. 1022 at 1:66-2:11.

41. A POSITA would have understood that an asymmetric compression algorithm is one in which “the encoder is more complex than the decoder.” Ex. 1017 at 1. MPEG was an example of such a system because its encoder is “algorithmic or adaptive whereas [its] decoder is ‘dumb’ and carries out fixed actions.” *Id.* at 1 & Figure 1.1 (annotated and reproduced below):

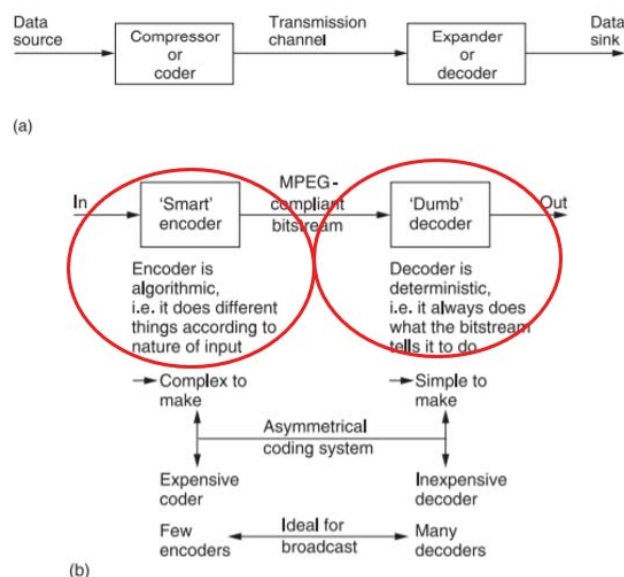


Figure 1.1 In (a) a compression system consists of compressor or coder, a transmission channel and a matching expander or decoder. The combination of coder and decoder is known as a codec. (b) MPEG is asymmetrical since the encoder is much more complex than the decoder.

42. The reason an MPEG encoder or compressor is substantially more complex than an MPEG decoder is that MPEG-compliant encoding requires computationally complex operations that MPEG-compliant decoding does not require. For example, an MPEG encoder has to perform a functionality known as

“block-based motion compensated prediction.” Ex. 1010 at 7. To do block-based motion compensated prediction, the encoder has to “search for the motion vectors, which is a computationally intensive task.” *Id.* For example, to encode a National Television System Committee (NTSC) digital video sequence that conforms to a standard known as the International Telecommunication Union-Radiocommunication Sector (ITU-R or CCIR) 601 Recommendation in real-time, “the amount of computation required for the search of the motion vectors is on the order of 10^9 operations per second (Gflops) if a full search algorithm is used.” *Id.* at pp.6-7. “Thus the MPEG algorithm is notoriously asymmetric, i.e. the amount of computation required for the encoding algorithm is much higher than that required for the decoding algorithm.” *Id.* at p. 7.

3. *Data Compression, Including Video Compression, Had Well-Known Benefits for Storage and Transmission of Data*

43. By February 2001, those skilled in the art understood the notion that data compression had well-known benefits when used in storing and transmitting data. For example, those skilled in the art understood that, by reducing the size of data, data compression allows a fixed-sized storage device to store more data in the same amount of space. Ex. 1017 at pp.3-4. This had known applications when it came to the storage of video data too. *Id.* A POSITA also understood that, in transmission systems, data compression allows reduction in bandwidth, faster transmission given a fixed bandwidth of a communication channel, and/or a better

quality given a fixed bandwidth. *Id.* Again, this was also applicable to video data as well as other forms of data. *Id.* Based on this understanding, MPEG-1 sought to facilitate storage of video data on a CD by compressing video data, and MPEG-2 sought to facilitate digital video broadcasting and digital video storage on DVD discs. *Id.*

IV. SUMMARY OF THE '535 PATENT AND ITS TECHNICAL FIELD

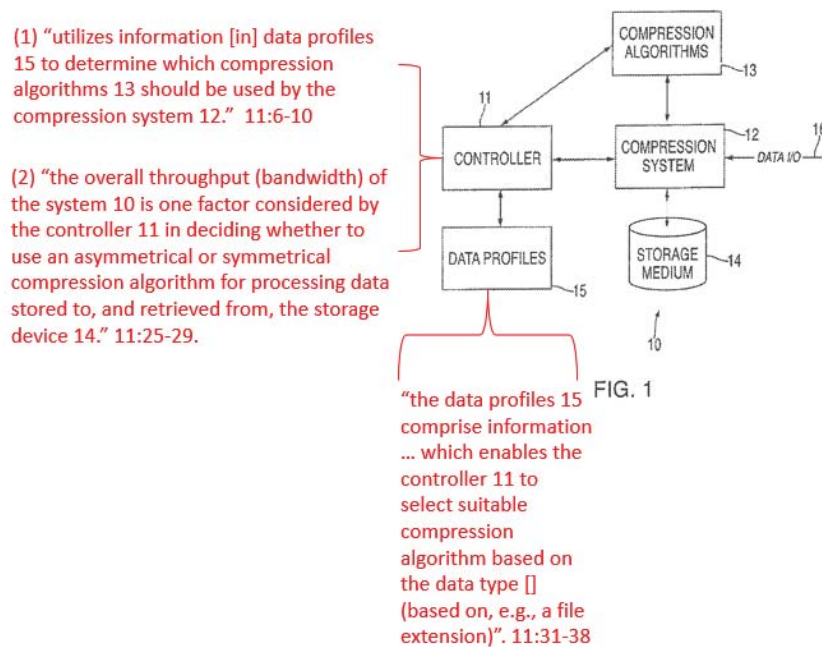
A. Introduction to the '535 Patent

44. The '535 patent, titled "Systems and methods for video and audio data storage and distribution," was filed on September 20, 2013, and issued on January 13, 2015. *See* Ex. 1001 (cover). The '535 claims priority to several U.S. patent applications, including U.S. Patent Application No. 13/154,239, filed on June 6, 2011 and issued as U.S. Patent No. 8,553,759; U.S. Patent Application No. 12/123/081, filed on May 19, 2008 and issued as U.S. Patent No. 8,073,047; U.S. Patent Application No. 10/076,013, filed on February 13, 2002 and issued as U.S. Patent No. 7,386,046; and U.S. Patent Application No. 60,268,394, a provisional application filed on February 13, 2001. The earliest application to which the '535 patent claims priority is U.S. Patent No. 7,386,046, the provisional application filed on February 13, 2001. As mentioned above, I have not analyzed whether the '535 patent is in fact entitled to that earlier filing date; I have instead assumed that it is for the purposes of my analysis.

B. Technical Background and Overview of the '535 Patent

45. The '535 patent states that the “technical field” of the patent relates to “data compression and decompression and, in particular, to a system and method for compressing and decompressing based on an actual or expected throughput (bandwidth) of a system that employs data compression.” Ex. 1001 at 1:21-22. The '535 patent further states that it additionally relates to “the subsequent storage, retrieval, and management of information in data storage devices utilizing either compression and/or accelerated data storage and retrieval bandwidth.” *Id.* at 1:25-29. The '535 patent also states that it “is directed to a system and method for compressing and decompressing based on the actual or expected throughput (bandwidth) of a system employing data compression and a technique of optimizing based upon planned, expected, predicted, or actual usage.” *Id.* at 7:51-55.

46. The '535 patent states that FIG. 1 depicts “a system for providing bandwidth sensitive data compression/decompression according to an embodiment of the present invention.” *Id.* at 10:31-34. FIG. 1, annotated with descriptive language from the specification in red, is depicted below:



47. As the '535 patent states, "FIG. 1 depicts a host system 10 comprising a controller 11 (e.g., a file management system), a compression/decompression system 12, a plurality of compression algorithms 13, a storage medium 14, and a plurality of data profiles 15." *Id.* at 10:34-38. According to the '535 patent, "[t]he controller 11 utilizes information comprising a plurality of data profiles 15 to determine which compression algorithms 13 should be used by the compression system 12." *Id.* at 11:6-10.

48. The data profiles 15 associate parameters or attributes of data (such as a file extension or other type of data) with a suitable compression algorithm for those data. "[T]he data profiles 15 [can] comprise information regarding predetermined access profiles of different data sets, which enables the controller 11 to select a

suitable compression algorithm based on the data type.” *Id.* at 11:34-35. The ’535 patent notes that, “[f]or instance, the data profiles may comprise a map that associates different data types (based on, e.g., a file extension) with preferred one(s) of the compression algorithms 13.” *Id.* at 11:35-38.

49. The ’535 patent suggests that the data profiles 13 may comprise information that associates parameters or attributes of data other than the type or extension of data with suitable compression algorithms. For example, the data profiles 13 may associate relative read/write frequency of data with suitable compression algorithms. *Id.* at 11:38-39. The ’535 patent presents a first profile that associates data that “is written to a storage medium once (or very few times) but is read from the storage medium many times” with suitable compression algorithms; a second profile that associates data that is “written to the storage medium often but read few times” with suitable compression algorithms; and a third profile that associates data that is “read from and written to the storage [] substantially the same” number of times with suitable compression algorithms. *Id.* at 11:40 (table). The below table, which appears in col. 12, line 50 of the ’535 patent, depicts such exemplary data profiles:

Access Profile	Example Data Types	Compression Algorithm	Compressed Data Characteristics	Decompression Algorithm
1. Write few, Read many	Operating systems, Programs, Web sites	Asymmetrical (Slow compress)	Very high compression ratio	Asymmetrical (Fast decompress)
2. Write many, Read few	Automatically updated inventory database	Asymmetrical (Fast compress)	Very high compression ratio	Asymmetrical (Slow decompress)
3. Similar number of Reads and Writes	User generated documents	Symmetrical	Standard compression ratio	Symmetrical

50. The '535 patent states that, in selecting a suitable compression algorithm for data, the controller 11 may “decid[e] whether to use an asymmetrical or symmetrical compression algorithm for processing data stored to, and retrieved from, the storage device 14.” *Id.* at 11:27-29. “An asymmetrical data compression algorithm is [] one in which the execution time for the compression and decompression routines differ significantly,” while a symmetric data compression algorithm “one in which the execution time for the compression and the decompression routines are substantially similar.” *Id.* at 9:63-66, 10:6-8. The '535 patent notes that “[e]xamples of asymmetrical compression algorithms include dictionary based compression schemes such as Lempel–Ziv,” while “[e]xamples of symmetrical algorithms include table-based compression schemes such as Huffman.” *Id.* at 10:2-5, 9.

51. The '535 patent notes that the controller 11 may, in addition or instead of the data profiles 15, use system bandwidth to select compression algorithms 13. “In a preferred embodiment, the overall throughput (bandwidth) of the system 10 is one factor considered by the controller 11 in deciding whether to use an asymmetrical or symmetrical compression algorithm for processing data stored to, and retrieved from, the storage device 14.” *Id.* at 11:25-29. The '535 patent indicates that “[t]he controller [can] track[] and monitor[] the throughput (e.g., data storage and retrieval) of the data compression system 12 and generate[] control signals to enable/disable different compression algorithms 13 when the throughput falls below a predetermined threshold.” *Id.* at 10:38-43. The '535 patent further notes that “[i]n one embodiment, the system throughput that is tracked by the controller 11 preferably comprises a number of pending access requests to the memory system.” *Id.* at 10:43-45.

52. FIG. 2 of the '535 patent is an illustration of “a flow diagram [of] a method for providing bandwidth sensitive data compression” *Id.* at 13:14-16. The '535 patent says that “the method depicted in FIG. 2 is implemented with a disk controller for providing accelerated data storage and retrieval from a hard disk on a PC (personal computer).” *Id.* at 13:18-21.

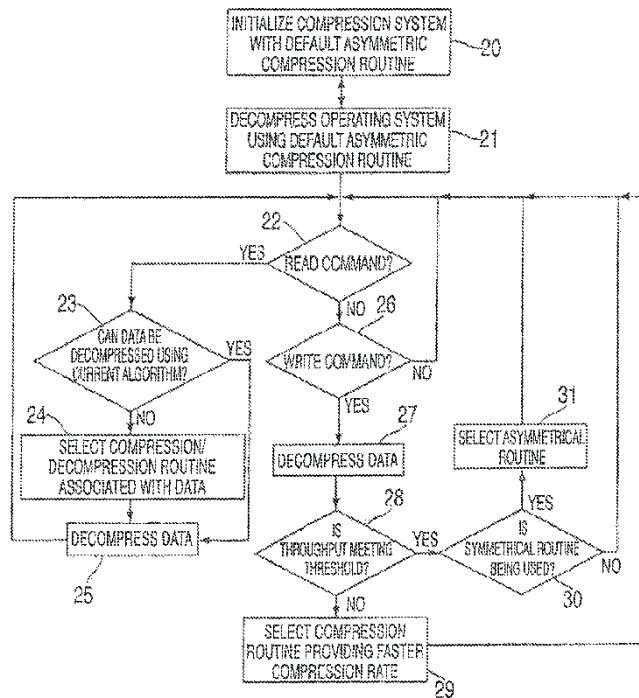


FIG. 2

53. The 535 patent describes the steps of FIG. 2 as follows:

54. **In step 20, the controller adopts a default compression routine:**

“The data compression system is initialized during a boot-up process after the PC is powered-on and a default compression/decompression routine is instantiated”. *Id.* at 13:21-24. “In a preferred embodiment, the default algorithm comprises an asymmetrical algorithm since an operating system and application programs will be read from hard disk memory and decompressed during the initial use of the system 10.” *Id.* at 13:25-28.

55. **In step 21, the controller decompresses the operating system using the default compression routine:** “The initial asymmetric routine that is applied

(by, e.g., a vendor) to compress the operating system and applications is preferably set as the default. The operating system will be retrieved and then decompressed using the default asymmetric routine”. *Id.* at 13:34-39.

56. **In steps 22-25, the controller selects a decompression routine and decompresses data in response to a read command:** “During initial runtime, the controller will maintain us[ing] the default algorithm until certain conditions are met. For instance, if a read command is received (affirmative result in step 22), the controller will determine whether the data to be read from disk can be compressed using the current routine (step 23). For this determination, the controller could, e.g., read a flag value that indicates the algorithm that was used to compress the file. If the data can be decompressed using the current algorithm (affirmative determination in step 23), then the file will be retrieved, and decompressed (step 25). On the other hand, if the data cannot be decompressed using the current algorithm (negative determination in step 23), the controller will issue the appropriate control signal to the compression system to load the algorithm associated with the file (step 24) and, subsequently, decompress the file (step 25).” *Id.* at 13:40-54.

57. **In steps 26-28, the controller compresses data and monitors system throughput in response to a write command:** “If a write command is received (affirmative result in step 26), the data to be stored will be compressed using the current algorithm (step 27). During the process of compression and storing the

compressed data, the controller will track the throughput to determine whether the throughput is meeting a predetermined threshold (step 28). For example, the controller may track the number of pending disk accesses (access requests) to determine whether a bottleneck is occurring.” *Id.* at 13:55-63.

58. In steps 28-29, the controller selects a compression algorithm in response to a write command and a determination of inadequate throughput from monitoring: “If the throughput of the system is not meeting the desired threshold (e.g., the compression system cannot maintain the required or requested data rates)(negative determination in step 28), then the controller will command the data compression system to utilize a compression routine providing faster compression (e.g., a fast symmetric compression algorithm) (step 29) so as to mitigate or eliminate the bottleneck.” *Id.* at 13:63-14:2.

59. In steps 28-31, the controller selects a compression algorithm in response to a write command and a determination of adequate throughput from monitoring: “If, on the other hand, the system throughput is meeting or exceeding the threshold (affirmative determination in step 28) and the current algorithm being used is a symmetrical routine (affirmative determination in step 30), in an effort to achieve optimal compression ratios, the controller will command the data compression system to use an asymmetric compression algorithm (step 31) that may

provide a slower rate of compression, but provide efficient compression.” *Id.* at 14:3-10.

V. PROSECUTION HISTORY

60. I have reviewed and considered the prosecution history of the ’535 patent and its related family members (i.e., the earlier patents and applications that the ’535 patent claims priority to). I note that none of the prior art that forms the basis of my opinion that the challenged claims are unpatentable was substantively discussed during the prosecution of the ’535 patent. Ishii was cited by Realtime during prosecution in an IDS, amongst 1500 other references cited by Realtime in various IDS’s, but was not specifically discussed by either Realtime or the examiner. Thus, the ’535 patent prosecution history was not particularly relevant to my opinions set forth in this declaration.

VI. CLAIM CONSTRUCTION

A. Legal Standards

61. I have been informed that for the purposes of this inter partes review, the standard for construction of terms within the claims of the patent is the “broadest reasonable construction” in light of the specification as it would be interpreted by one of ordinary skill in the art, which is different from the standard that applies in federal district court litigation.

1. “data block”

62. I have been asked to provide my opinions regarding the meaning of the term “data block” as it is used in various claims of the ’535 patent. *See* Ex. 1001, cls. 1-6, 8-12, 14-17, 19, 21, 22, and 24. Based on my review of the specification from the perspective of a person of ordinary skill in the art, I conclude that the term “data block” has a broad, yet reasonable meaning of “a single unit of data, which may range in size from individual bits through complete files or collections of files.”

63. The ’535 patent does not define the term “data block,” but notes that “[b]lock sizes are often fixed, but may be variable in size.” Ex. 1001, 7:4-5. Moreover, the ’535 patent incorporates U.S. Patent Nos. 6,195,024 and 6,309,424, which are also directed to data compression. Ex. 1001, 5:33-38. I understand from counsel for Petitioner that this means that these patents should be treated as if they were included in the ’535 patent text itself. The ’024 patent says that data blocks input into a data compression system “may range in size from individual bits through complete files or collections of multiple files” and, like the ’535 patent says that they “may be fixed or variable.” Ex. 1014, 15:6-9. The ’424 patent repeats this exact language. Ex. 1006, 15:11-14.

64. In light of these aspects of the ’535 patent, a person of ordinary skill in the art would conclude that the term “data block” has a meaning that includes: “a

single unit of data, which may range in size from individual bits through complete files or collections of files.”

2. “*access profile*”

65. I have been asked to provide my opinions regarding the meaning of the phrase “access profile.” found in certain of the claims of the ’535 patent. See, e.g., Ex. 1001, cls. 1 & 14. Based on my review of the specification of the ’535 patent from the perspective of a POSITA, the term “access profile” should have a broad, but reasonable interpretation of “a profile (1) having information used in data compression and (2) being associated with one or more characteristics of data to be compressed.”

66. While the ’535 patent does not expressly define the term “access profile,” it gives some examples of its purpose. I understand that the language of the claims can be informative regarding the meaning of a claim term or phrase. Here, language from certain claims of the ’535 patent shows that an access profile is chosen based upon a determined parameter or attribute of data to be compressed. See Ex. 1001, cl 1 (“determining a parameter or attribute of at least a portion of a data block having audio or video data; *selecting an access profile* from among a plurality of access profiles *based upon the determined parameter or attribute*; and *compressing the at least the portion of the data block* with one or more compressors using asymmetric data compression and *information from the selected*

access profile to create one or more compressed data blocks, *the information being indicative of the one or more compressors to apply to the at least the portion of the data block.*”) (emphasis added).

67. According to the description in the ’535 patent, an access profile “enables the controller to determine a compression routine that is associated with a data type of the data to be compressed” and “enables the controller to select a suitable compression algorithm.” *Id.* at 8:4-11. The description also notes that “[i]n a preferred embodiment, the data profiles 15 comprise information regarding predetermined access profiles of different data sets, which enables the controller 11 to select a suitable compression algorithm based on the data type.” *Id.* at 11:31-35.

68. The ’535 patent also discusses access profiles that describe relative frequency of read and write of data. *See id.* at 11:41 (“Access Profile 1: Data is written to a storage medium once [] but is read from the storage medium many times.”). Therefore, the access profile according to these examples relates to a characteristic of the data—i.e., its read/write frequency.

69. Therefore, a person of ordinary skill in the art would have understood the term “access profile” has a meaning that includes “a profile (1) having information used in data compression and (2) being associated with one or more characteristics of data to be compressed.”

3. “asymmetric data compression” and “asymmetric compressor”

70. I have been asked to provide my opinion regarding the meaning of the phrase “asymmetric data compression” found in many of the claims of the ’535 patent. *See, e.g.*, Ex. 1001, cl.1, 10, 12, 14, 15, 24. Based on my review of the specification from the perspective of a person of ordinary skill in the art the term “asymmetric data compression” should mean “a data compression algorithm in which the execution time for the compression and decompression routines differ significantly.” And, the term “asymmetric compressor” should be understood to refer to a “compressor that uses an asymmetric data compression algorithm” as the term “asymmetric data compression” is defined in the ’535 patent. I understand from counsel for Petitioner that when a patentee defines a word or phrase used in the claims, that definition should be applied to understand the claim. That has occurred here; the patent applicants defined the term “asymmetric data compression algorithm.” The ’535 patent says that “[a]n asymmetrical data compression algorithm is referred to herein as one in which the execution time for the compression and decompression routines differ significantly. In particular, with an asymmetrical algorithm, either the compression routine is slow and the decompression routine is fast or the compression routine is fast and the decompression routine is slow.” Ex. 1001, 9:63-10:2.

71. In light of this, a person of ordinary skill in the art would have understood the term “asymmetric data compression” as used in the claims of the ’535 patent to encompass “a data compression algorithm in which the execution time for the compression and decompression routines differ significantly.” Additionally, a person of ordinary skill in the art would have understood that the term “asymmetric compressor” as used in, for example, claim 15 of the ’535 patent means “a compressor that uses an asymmetric data compression algorithm,” where “asymmetric data compression” has the meaning referred to above.

VII. LEGAL STANDARDS

A. Anticipation

72. I have been advised that if each and every element or step of a claim is disclosed within the “four corners” of a prior art reference, that claim is said to be “anticipated” by that single prior art reference and is invalid under 35 U.S.C. § 102 because the claimed invention is not, in fact, new or novel. I understand that the standard for anticipation in an inter partes review proceeding is by a preponderance of the evidence. I also have been advised that a prior art reference can disclose a claim feature if that feature is expressly described by that reference, or inherent from its disclosure. I understand that something is inherent from a prior art reference if the missing descriptive matter must necessarily be present and it would have been so recognized by a person of ordinary skill in the art. I also understand that inherency

cannot be established by probabilities or possibilities and that the mere fact that something may result from a given set of circumstances is not sufficient to show inherency.

73. I also have been advised that a prior art document can disclose a claim feature and anticipate a claimed invention if that feature is described in another document that has been incorporated by reference.

B. Obviousness

74. I understand that a claim may be invalid under § 103(a) if the subject matter described by the claim as a whole would have been obvious to a hypothetical person of ordinary skill in the art in view of a prior art reference, or in view of a combination of references at the time the claimed invention was made. Therefore, I understand that obviousness is determined from the perspective of a hypothetical person of ordinary skill in the art and that the asserted claims of the patent should be read from the point of view of such a person at the time the claimed invention was made. I further understand that a hypothetical person of ordinary skill in the art is assumed to know and to have all relevant prior art in the field of endeavor covered by the patent in suit and all analogous prior art. I understand that the standard for obviousness in an inter partes review proceeding is by a preponderance of the evidence.

75. I also understand that an analysis of whether a claimed invention would have been obvious should be considered in light of the scope and content of the prior art, the differences (if any) between the prior art and the claimed invention, and the level of ordinary skill in the pertinent art involved. I understand as well that a prior art reference should be viewed as a whole. I understand that in considering whether an invention for a claimed combination would have been obvious, I may assess whether there are apparent reasons to combine known elements in the prior art in the manner claimed in view of interrelated teachings of multiple prior art references, the effects of demands known to the design community or present in the market place, and/or the background knowledge possessed by a person of ordinary skill in the art. I also understand that other principles may be relied on in evaluating whether a claimed invention would have been obvious, and that these principles include the following:

76. A combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results;

77. When a device or technology is available in one field of endeavor, design incentives and other market forces can prompt variations of it, either in the same field or in a different one, so that if a person of ordinary skill in the art can implement a predictable variation, the variation is likely obvious;

78. If a technique has been used to improve one device, and a person of ordinary skill in the art would have recognized that it would improve similar devices in the same way, using the technique is obvious unless its actual application is beyond his or her skill;

79. I have been informed that an explicit or implicit teaching, suggestion, or motivation to combine two prior art references to form the claimed combination may demonstrate obviousness, but proof of obviousness does not depend on or require showing a teaching, suggestion, or motivation to combine, see, e.g., Manual of Patent Examining Procedure § 2143(G);

80. Market demand, rather than scientific literature, can drive design trends and may show obviousness;

81. In determining whether the subject matter of a patent claim would have been obvious, neither the particular motivation nor the avowed purpose of the named inventor controls;

82. One of the ways in which a patent's subject can be proved obvious is by noting that there existed at the time of invention a known problem for which there was an obvious solution encompassed by the patent's claims;

83. Any need or problem known in the field of endeavor at the time of invention and addressed by the patent can provide a reason for combining the elements in the manner claimed;

84. “Common sense” teaches that familiar items may have obvious uses beyond their primary purposes, and in many cases a person of ordinary skill in the art will be able to fit the teachings of multiple patents together like pieces of a puzzle;

85. A person of ordinary skill in the art is also a person of ordinary creativity, and is not an automaton;

86. A patent claim can be proved obvious by showing that the claimed combination of elements was “obvious to try,” particularly when there is a design need or market pressure to solve a problem and there are a finite number of identified, predictable solutions such that a POSITA would have had good reason to pursue the known options within his or her technical grasp; and

87. One should be cautious of using hindsight in evaluating whether a claimed invention would have been obvious.

88. I understand that, in making a determination as to whether or not the claimed invention would have been obvious to a person of ordinary skill in the art, the Board may consider certain objective factors if they are present, such as: commercial success of product(s) practicing the claimed invention; long-felt but unsolved need; teaching away; unexpected results; copying; and praise by others in the field. These factors are generally referred to as “secondary considerations” or “objective indicia” of non-obviousness. I understand, however, that for such objective evidence to be relevant to the obviousness of a claim, there must be a

causal relationship (called a “nexus”) between the claim and the evidence. I also understand that this nexus must be based on a novel element of the claim rather than something in the prior art. I also understand that there are instances when secondary considerations are unable to overcome primary evidence of obviousness (e.g., motivation to combine with predictable results) that is sufficiently strong.

VIII. ANALYSIS OF THE CHALLENGED CLAIMS OF THE ’535 PATENT

A. The Challenged Claims

89. I have been asked to evaluate and have evaluated claims 1-6, 8-12, 14-17, 19, 21, 22, and 24 of the ’535 patent. I have also considered portions of the ’535 patent prosecution history.

IX. INVALIDITY

A. Claims 1-2, 9-10, and 14 Are Anticipated By Dvir, or, In the Alternative, Would Have Been Obvious Over the Combined Teachings of Dvir and Koz as Understood By a POSITA

90. Based on my review and analysis of the materials cited herein, my opinions regarding the understanding of a person of ordinary skill in the art in February 2001, and my training and experience, it is my opinion that Dvir anticipates claims 1-2, 9-10, and 14 of the ’535 patent , or, in the alternative, that Dvir and Koz render obvious claims 1-2, 9-10, and 14 of the ’535 patent. The reasons for my conclusion are explained below.

1. Assumptions

91. For the purposes of my analysis, I have been informed that Dvir is prior art to the '535 patent under 35 U.S.C. § 102(e) and I have assumed that information is correct for the purposes of my analysis.

92. For the purposes of my analysis, I have been informed that Koz is prior art to the '535 patent under 35 U.S.C. § 102(b) and I have assumed that information is correct for the purposes of my analysis.

2. Overview of Dvir

93. Dvir discloses a “system and method for rapid video data compression and transmission for a wireless remote monitor.” Ex. 1007, Abst. “The display data must be compressed according to a suitable video compression method before transmission decompression and display” on the wireless remote server. *Id.* at 4:50-54. FIGs. 2 and 3a depict an exemplary embodiment of this arrangement having an “internal implementation” where “the components of the multimedia compression system are contained within a main computer 34.” *See id.* at 8:1-4.

94. Dvir explains that the “[m]ain computer 34 features a video display card 38 ... which is connected to a video switch 40.” *Id.* at 8:7-9. To display video data on the remote display, such data is “encoded for remote transmission by MPEG encoder 42.” *Id.* at 8:9-14. After encoding data, the “MPEG encoder 42 then transmits the combined audio and video data to a converter 48, [which] converts the

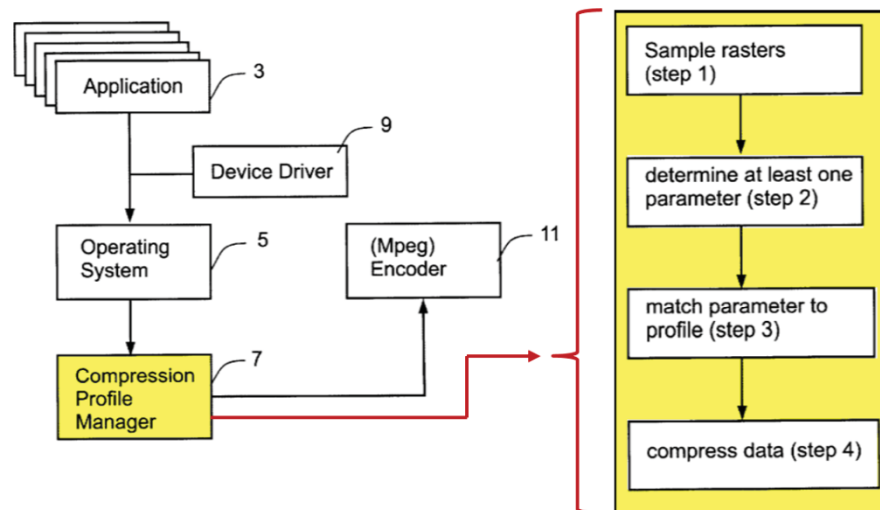
combined data into radiowaves, which are then transmitted by an ISM band SP2 transmitter 50 for transmitter radiowaves to the wireless monitor.” Ex. 1007 at 8:29-33.

95. The wireless monitor depicted in FIG. 2 “is connected to a radiofrequency (RF) transceiver 12, which communicates with [the] main computer [] through radiowave communication.” *Id.* at 7:13-15. After receiving the data through the transceiver 12, “[t]he data is then decoded by a decoder 18, which provides the video portion of the data to a display screen 20.” *Id.* at 7:36-38.

96. Dvir explains that the display data of the main computer are produced by various software applications. *Id.* at 4:47-50. Dvir recognizes that “multimedia data compression methods are most efficient when adjusted for the type of multimedia data being transmitted,” and therefore when “multiple types of multimedia data are transmitted, the compression method must be determined separately for each type of data.” *Id.* at 2:11-13, 17-20. Therefore, Dvir states that “different compression profiles would be required for television video stream, a word processing screen stream, a three-dimensional video game video stream, and so forth.” *Id.* at 5:23-26.

97. Dvir recognizes that the compression algorithm for data must be adjusted “according to the characteristics of the data itself.” Ex. 1007 at Abst. Thus, Dvir discloses a compression system in which “the type and profile of video data

compression is selected by a profile manager, which detects the characteristics of the video data to determine the character of the data, and then which selects the video data compression method and profile according to the video data character.” *Id.* at Abst. An exemplary embodiment of such a system is depicted in Dvir’s FIGs. 1a and 1b, annotated and reproduced below:



98. The system depicted in FIG. 1a “features a plurality of software applications 3 for producing different types of display data,” where the “[s]oftware applications 3 are operated by an operating system 5.” *Id.* at 4:47-50. Dvir explains that the operating system 5 and a device driver 9 supply information to the compression profile manager 7 to enable the compression profile manager 7 to select a suitable compression algorithm for the encoder 11:

In order for the data to be suitably compressed, the video compression method must be selected to be compatible with the particular type of data produced by each software

application 3. Therefore, operating system 5 feeds the display data to a compression profile manager 7. The process is controlled by a separate reporting device driver 9, for causing operating system 5 to report the type of each software application 3 which is running to compression profile manager 7. Preferably, reporting device driver 9 also causes operating system 5 to report the screen resolution to compression profile manager 7.

Ex. 1007 at 4:55-65.

99. The compression profile manager first “receives the pertinent information concerning the type of video display data which is being produced”. *Id.* at 4:66-5:1. This may be done in accordance with steps 1 and 2 of FIG. 1b. Dvir explains that, “[i]n step 1, the video data to be transmitted is analyzed.” *Id.* at 5:30-31 (emphasis added). “For example, groups of rasters of the video data are optionally sampled for analysis.” *Id.* at 5:31-33. Dvir notes that “[p]referably, each such group is a block of 8×8 pixels.” *Id.* at 5:34-35.

100. “In step 2, at least one parameter is determined for each sample.” *Id.* at 5:36-37. Dvir notes that “[p]referably, the parameter includes, but is not limited to, a number of unique colors in the screen, a presence of static dark thin rows of pixels or large static blocks, and a level of motion in the screen between one frame and the next frame. More preferably, a plurality of such parameters is analyzed.”

Ex. 1007 at 5:37-41.

101. “Once compression profile manager 7 has received the pertinent information concerning the type of video display data which is being produced, compression profile manager 7 can select the particular type of video compression method for compressing the display data.” *See id.* at 4:66-5:3. To do so, the compression profile manager first determines a profile for the video data, as depicted in step 3 of FIG. 1b. In this step, “the plurality of parameters are matched to a particular compression profile, which is then selected by the compression profile manager 7.” *Id.* at 5:42-45.

102. “Compression profile manager 7 has a plurality of compression profiles, each of which is suitable for a particular type of display data which is produced by a particular software application 3.” *Id.* at 5:3-6. “As each type of display data is passed from operating system 5, compression profile manager 7 selects a suitable compression profile for compressing the video data, according to the characteristics of the display data.” Ex. 1007 at 5:6-10.

103. Dvir explains that “[f]or example, different compression profiles would be required for television video stream, a word processing screen stream, a three-dimensional video game video stream, and so forth.” *Id.* at 5:23-26. Dvir further explains that, “[f]or example, the presence of thousands of unique colors in a frame with considerable movement between frames, as well as unchanged black stripes at the bottom and top of each frame, would indicate that a DVD movie is being

transmitted[; thus t]he appropriate compression profile for the DVD movie would then be selected.” *Id.* at 5:45-51.

104. “Once the proper compression profile for the display data is selected, the actual process of compression is performed by an MPEG (Motion Picture Expert Group) encoder 11 or other type of compression algorithm.” *Id.* at 5:14-17. This is depicted in step 4 of FIG. 1b. “In Step 4, the compression profile is set to determine the particular video compression method for compressing the video data. The data is then compressed and transmitted.” *Id.* at 6:43-45. “The compression profile would be adjusted according to such factors as the maximum resolution, refresh rate and color handling.” *Id.* at 5:52-54.

105. Dvir provides various examples of profiles used to compress various types of video data:

An exemplary compression profile for a television video stream would feature a main level, main profile MPEG-2 compression method with frame groups of 12 frames: IBB PBB PBB PBB. The method would feature progressive encoding, or deinterlacing, and low pass filtering. The motion vectors would be 32×32 for the P frames and 16×16 for the B frames.

On the other hand, an exemplary compression profile for a word processing screen stream at a 800×600 resolution would be high profile, high level variable MPEG-2 stream

with frame groups of 9 frames: IBB PBB PBB. In cases where flawless quality is necessary all of the B frames could be omitted, such that a rate of 30 frames per second becomes a rate of 10 tripled frames per second. The motion vectors are 24×24 for the P frames and 8×8 for the B frames. No filters are applied.

For the 3-D video game video data, an exemplary compression profile would optionally feature a high profile, high level MPEG-2 compression method at 60 frames per second, thereby halving the delay caused by the compression process itself. Preferably, the compression method would feature groups of 18 frames: IBPBPBPBPBPBPBPBPB. All of the B frames are deleted, such that a frame rate of 60 frames per second becomes a rate of 30 doubled frames per second. The motion vectors are 48×48 for the P frames and 8×8 for the B frames.

Ex. 1007, 6:16-41. These are just some of the algorithms that a person of ordinary skill in the art would have understood could be applied based on the type of video data to be compressed based on Dvir's techniques.

3. *Overview of Koz*

106. Koz discloses "a digital compression apparatus" utilizing two encoders.

Ex. 1022 at Abst. Koz uses a dual encoding process whereby a first MPEG

compression is performed on a group of pictures (“GOP”) and based on the results of that compression, parameters are adjusted and the uncompressed video stream is compressed again based on the adjusted parameters. *Id.* at 12:33-61. By doing this, Koz “improves various aspects of video data compression by dynamically ... applying ... filtering and encoding parameters during a second, delayed encoding of a stored representation of an input digital data structure ... based on the results of a first encoding of the input data structure” *Id.* at 1:13-18.

107. Koz discloses that “a first compression encoding step associated with a first encode circuit . . . produce[s] a first statistical data set from a first compression encoding of [a] bit stream representing a group of pictures (GOP).” Ex. 1022 at Abst. “The initial bit stream . . . is . . . stored in a first memory, while the first compression encoding is performed.” *Id.* “Concurrently with, or following the first compression of the GOP data by the first encoder, a companion processor uses the first statistical data set and optional additional information to compute a set of filter and encoder control settings.” *Id.* “The initial digital video bit stream . . . previously stored in the first memory is retrieved from the memory after the first encoding step and is input as a time delayed version of the initial digital video bit stream through a set of filters and subsequently through a second compression encode circuit to produce a second compressed video bit stream of the GOP data.” *Id.*

108. During the second compression process, MPEG “filters are configured to provide dynamically variable filter characteristics that are responsive to the filter control settings from the companion processor.” *Id.* Moreover, “[t]he second encode circuit also has encoder characteristics responsive to the encoder control settings.” *Id.*

109. The dual-encoding process disclosed in Koz has many advantages. “The filter and encoder control settings selected by the companion enable the second encoder to provide enhanced compression encoding performance second compression encoding of the GOP data video bit stream relative to the compression of the first encode circuit.” *Id.* at Abst. In particular, the second compressed bit stream may have improved performance in either or both bit rate and total bits relative to the compression of the first encode circuit.” *Id.* at Abst.

110. Koz further recognizes the well-understood fact that MPEG encoding is “asymmetrical.” *See* Ex. 1022 at 2:9-11 (“As with most interframe compression schemes, MPEG is asymmetric—compression requires more effort than decompression.”). Moreover, Koz discusses many aspects of MPEG encoding techniques that were known to those of skill in the art. *See generally* Ex. 1022 at 2:12-9:35.

4. *Claim 1 is Anticipated by Dvir, or, In the Alternative, Would Have Been Obvious Over the Combined Teachings of Dvir and Koz as Understood By a POSITA*

111. Claim 1 recites:

[1[P]] A method, comprising:

[1[A]] determining a parameter or attribute of at least a portion of a data block having audio or video data;

[1[B]] selecting an access profile from among a plurality of access profiles based upon the determined parameter or attribute; and

[1[C][i]] compressing the at least the portion of the data block with one or more compressors using asymmetric data compression and information from the selected access profile to create one or more compressed data blocks,
[1[C][ii]] the information being indicative of the one or more compressors to apply to the at least the portion of the data block.

Ex. 1001, cl.1. The numbers and letters in brackets and bold have been added for ease of reference.

112. Dvir discloses all aspects of claim 1 of the '535 patent. Therefore, it is my opinion that Dvir alone anticipates claim 1. However, if one were to argue that Dvir does not expressly disclose that MPEG compression is asymmetric, then as an alternative it is my further opinion that the combination of Dvir and Koz renders claim 1 obvious, for the reasons I explain below for claim element **[1[C][i]]**.

a. [1[P]]: “A method comprising:”

113. I have not been asked to render an opinion as to whether the preamble—i.e., the language “[a] method comprising”—limits claim 1. For the purposes of my analysis I have assumed that the preamble of claim 1 is limiting. The preamble requires “[a] method comprising” Ex. 1001, cl.1. A person of ordinary skill in the art would have understood that Dvir discloses a method.

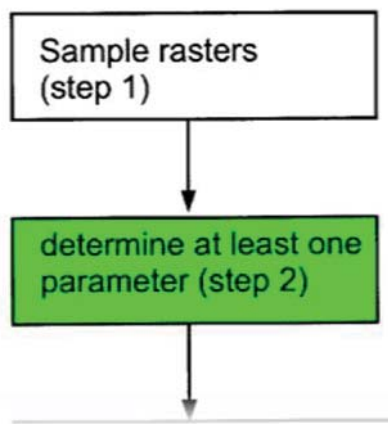
114. For example, in the abstract Dvir states that it discloses “[a] system and method for rapid video data compression and transmission” A number of other passages in Dvir show that Dvir is teaching a method for compressing video data. *See, e.g.*, Ex. 1007 at 2:51-57 (“The present invention is of a system and method for rapid multimedia data compression and transmission for a wireless remote monitor. The method of multimedia data compression according to the present invention adjusts the compression method according to the type of software application which generated the multimedia data, and hence according to the characteristics of the data itself.”); 4:39-46 (“Referring now to the drawings, FIG. 1A is a schematic block diagram illustrating an exemplary system according to the present invention, while FIG. 1B is a flowchart of an exemplary method according to the present invention. Although FIGS. 1A and 1B are drawn toward video compression methods, it is understood that this is for the purposes of description only, without any intention of being limiting in any way.”); 5:27-31 (“Preferably, an automatic video content

analysis method would be employed to analyze the type of video data and would select a particular compression profile according to the type of video data. A preferred implementation of such an automatic method is given in FIG. 1B.”); 7:64-67 (“These configurations preferably perform the method for compression of multimedia data according to the present invention, as described with regard to FIGS. 1A and 1B.”). Therefore, Dvir discloses “[a] method.”

- b. [1[A]]: “determining a parameter or attribute of at least a portion of a data block having audio or video data;”

115. Claim 1 requires “determining a parameter or attribute of at least a portion of a data block having audio or video data.” Ex. 1001, cl.1. A person of ordinary skill in the art would have understood that this aspect is disclosed by Dvir too.

116. Step 2 of FIG. 1b of Dvir illustrates a step of determining a parameter or attribute of at least a portion of a data block:



Ex. 1007, Fig. 1b (excerpt).

117. Before step 2, “the video data to be transmitted is analyzed [and] optionally sampled for analysis.” Ex. 1007 at 5:31-33. In step 2, “at least one parameter is determined for each sample.” *Id.* at 5:36-37. Dvir discloses that “the parameter includes, but is not limited to, [one or more of] a number of unique colors in the screen, a presence of static dark thin rows of pixels or large static blocks, and a level of motion in the screen between one frame and the next frame.” *Id.* at 5:37-41.

118. A person of ordinary skill in the art would have understood Dvir to disclose analyzing one frame of video data or two consecutive frames of video data depending on the desired parameter or attribute of video data. This is because determining two of the data parameters specified in Dvir requires analyzing only one frame of video data while determining a third requires analyzing at least two frames such as consecutive frames. *See* Ex. 1007 at 5:38-41. In particular, determining “a number of unique colors in the screen and a presence of static dark thin rows of pixels or large static blocks” requires analyzing only one frame of video data, while determining “a level of motion in the screen between one frame and the next frame” requires analyzing two frames of video data. *See id.*

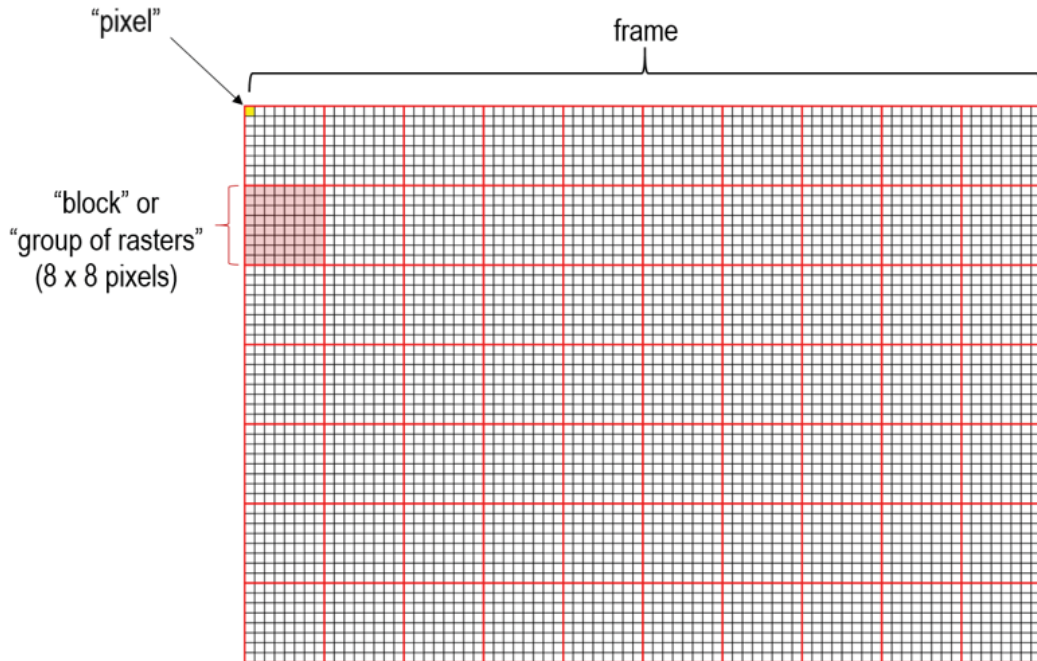
119. Both a single frame of video data and two consecutive frames of video data are *data blocks* under the interpretation of data blocks given above. A person of ordinary skill in the art would have understood a frame of video data or two

consecutive frames of video of data to be a unit of data. In the context of Dvir, frames of data input into the compression process are units of data that store the pixel information for an individual image in a sequence of images; as such they are units of data. Additionally pairs of frames can be used to determine whether there is motion between two images. Dvir can determine “motion in the screen between one frame and the next frame,” Ex. 1007, 5:38-41, and in this context two consecutive frames is a “unit of data” that is needed to determine the existence of motion in the video stream.

120. Dvir discloses that “groups of rasters of the video data are optionally sampled for analysis. Preferably, each such group is a block of 8x8 pixels.” Ex. 1007 at 5:31-34. These groups of rasters are blocks of pixels within frames and therefore would have been understood to constitute “at least a portion of a data block” as required by this limitation of claim 1 of the ’535 patent. *See* Ex. 1001, cl.1. And Dvir discloses that the data blocks include video data. *See, e.g.*, Ex. 1007 at 4:47-54 (“As shown in FIG. 1A, a system 1 features a plurality of software applications 3 for producing different types of display data. Software applications 3 are operated by an operating system 5. The display data must be compressed according to a suitable video compression method before transmission decompression and display, for example by the remote monitor of FIG. 2, and for the systems of FIGS. 3A-3B.”); 5:6-11 (“As each type of display data is passed from

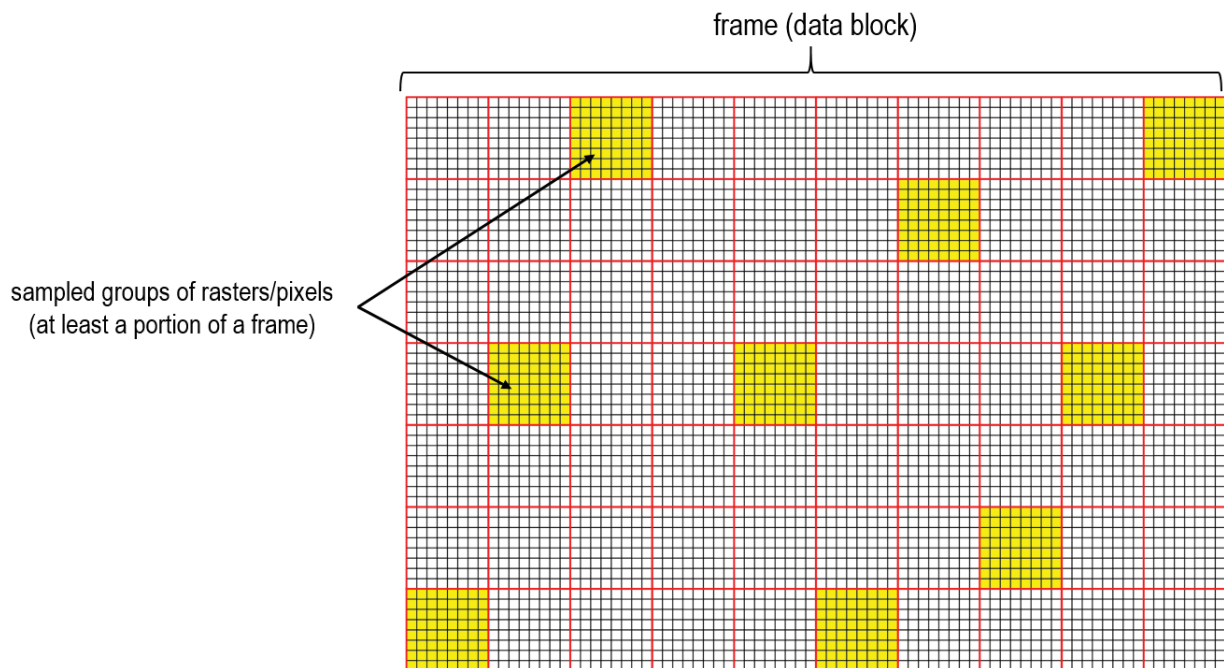
operating system 5, compression profile manager 7 selects a suitable compression profile for compressing the video data, according to the characteristics of the display data, as described in greater detail with regard to FIG. 1B.”).

121. Based on the disclosures of Dvir discussed above, a person of ordinary skill in the art would have understood that Dvir discloses inputting video data in the form of frames of pixels into the disclosed system for compressing and transmitting such data. Each frame has a number of pixels, and Dvir calls a group of 64 pixels (arranged 8 x 8) a “block.” Ex. 1007 at 5:33-34. This use of the word “block” to refer to a rectangular group of pixels was common in video compression (*see, e.g.*, Ex. 1017 at p. 257) and would have been well understood by a POSITA who would also understand it as being distinct from the ‘535 patent claim term *data block*. Dvir also calls each such 8x8 block of pixels a “group.” Ex. 1007, 5:30-34. Some illustrations showing how a person of ordinary skill in the art would have understood Dvir’s teachings in this regard appear below.



122. In this figure, an illustrated frame of video data is shown. Here, the frame is illustrated with a size of 80 pixels wide by 56 pixels high. This is merely for the purposes of illustration; a person of ordinary skill in the art would have understood that a frame of video data usually has a much larger number of pixels. Nevertheless, the graphic above is sufficient to illustrate the concepts from Dvir. Here, a pixel is shown highlighted in yellow in the top left corner of the frame. Groups of rasters or blocks are outlined in red.

123. The next illustration shows how Dvir would have been understood to "sample" "groups of rasters," where each "group" that is sampled is shown highlighted in yellow.



124. And, in instances in which Dvir is determining whether there is motion in the video stream, a person of ordinary skill in the art would have understood that multiple groups would have been sampled across multiple frames. *See, e.g.*, Ex. 1007 at 5:35-41 (referring to “a level of motion in the screen between one frame and the next frame”).

125. Based on the foregoing, Dvir discloses this limitation in at least three different ways: (1) where the “frame” is the unit of data, Dvir discloses determining parameters or attributes of the frame (and indeed characterizes the video stream) based on characteristics of the sampled groups of pixels (i.e., at least a portion of a data block); (2) where the “frame” is the unit of data, Dvir discloses that the characteristics of the samples are determined, and (3) Dvir discloses that where

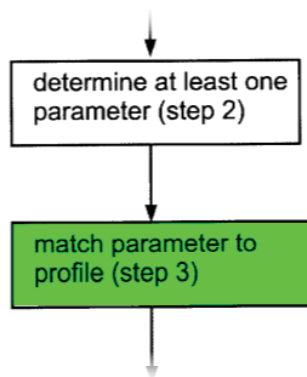
motion is to be detected, the unit of data includes two frames, and at least a portion of the data is analyzed to determine “a level of motion” between those two frames.

126. Based on the foregoing, and my reading of Dvir as a whole from the perspective of a person of ordinary skill in the art, Dvir discloses “determining a parameter or attribute of at least a portion of a data block having . . . video data” as required by claim 1 of the ’535 patent. Ex. 1001 at cl.1.

- c. [1[B]]: “selecting an access profile from among a plurality of access profiles based upon the determined parameter or attribute;”

127. Claim 1 requires “selecting an access profile from among a plurality of access profiles based upon the determined parameter or attribute.” Ex. 1001, cl.1. A person of ordinary skill in the art would have understood that this aspect is disclosed by Dvir too.

128. Step 3 of FIG. 1b of Dvir illustrates a step of selecting an access profile from among a plurality of access profiles based upon the determined parameter or attribute:



129. Dvir explains that, “[i]n step 3, the plurality of parameters is matched to a particular compression profile, which is then selected by compression profile manager.” Ex. 1007 at 5:43-45. Dvir further explains that

Preferably the type of multimedia data compression is selected by a profile manager, which detects the characteristics of the multimedia data to determine the character of the data, and then which selects the multimedia data compression profile, then which selects the multimedia data compression profile, including the compression method according to the character of the data.

Ex. 1007 at 2:57-63. Therefore, a person of ordinary skill in the art would have understood that Dvir discloses selecting an access profile from among a plurality of access profiles based on the determined parameter or attribute.

130. Regarding the determined parameters or attributes, and as discussed in further detail above, Dvir explains that “[f]or example, the presence of thousands of unique colors in a frame with considerable movement between frames, as well as unchanged black stripes at the bottom and top of each frame, would indicate that a DVD movie is being transmitted. The appropriate compression profile for the DVD movie would then be selected.” *Id.* at 5:45-51. Beyond characterizing the video data as a DVD movie, Dvir also gives examples including “a television video stream,” “a word processing screen stream,” and “3-D video game video data.” Ex. 1007, 6:16-41. And, Dvir describes exemplary profiles that may be applied to those

different types of video data based on the determined parameters or attributes of the video data in the data block.

131. Additionally, a person of ordinary skill in the art would have understood that Dvir's compression profiles are access profiles within the meaning of that term in the '535 patent. Dvir discloses compression profiles that include information used in data compression and that is associated with characteristics of the data to be compressed. For example, Dvir discloses that a compression profile may include information about the MPEG profile and level of compression (e.g., main profile, main level or high profile, high level), the number of frames in a group, the type of encoding, the size of motion vectors, and filtering to be applied in connection with the encoding – all information used in data compression. *See, e.g.*, Ex. 1007 at 6:16-23 (“An exemplary compression profile for a television video stream would feature a main level, main profile MPEG-2 compression method with frame groups of 12 frames: IBB PBB PBB PBB. The method would feature progressive encoding, or deinterlacing, and low pass filtering. The motion vectors would be 32×32 for the P frames and 16×16 for the B frames.”). Dvir discloses that a compression profile may be associated with characteristics of the data in the data blocks to be compressed such as the number of unique colors in the data, the movement between frames, and the presence of static black stripes at the bottom and top of the frames. *See, e.g.*, Ex. 1007 at 5:45-51 (“For example, the presence of

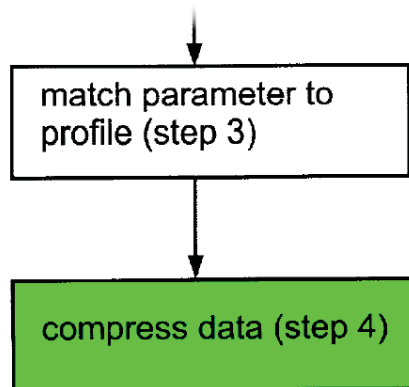
thousands of unique colors in a frame with considerable movement between frames, as well as unchanged black stripes at the bottom and top of each frame, would indicate that a DVD movie is being transmitted. Thus, the appropriate compression profile for the DVD movie would then be selected.”); *see also id.* at 2:58-63 (“Preferably, the type of multimedia data compression is selected by a profile manager, which detects the characteristics of the multimedia data to determine the character of the data, and then which selects the multimedia data compression profile, including the compression method according to the character of the data.”).

132. Based on the foregoing, and my reading of Dvir as a whole from the perspective of a person of ordinary skill in the art, Dvir discloses “selecting an access profile from among a plurality of access profiles based upon the determined parameter or attribute” as required by claim 1 of the ’535 patent. Ex. 1001 at cl.1.

- d. [1][C][i]]: “compressing the at least the portion of the data block with one or more compressors using asymmetric data compression and information from the selected access profile,”

133. Claim 1 recites “compressing at least a portion of the data block with one or more compressors using asymmetric data compression and information from the selected access profile.” Ex. 1001, cl.1. A person of ordinary skill in the art would have understood that this aspect is also disclosed by Dvir.

134. Step 4 of FIG. 1b of Dvir illustrates compressing the at least a portion of the data block with one or more compressors and information from the selected access profile:



Ex. 1007, FIG. 1b.

135. Dvir discloses that a selected profile includes information used by the compressor when compressing the video data. This information includes, for example, filtering information, the frame structure of a group of pictures, the type of encoding (e.g., “progressive” encoding), and information about the motion vectors *See, e.g., id.* at 5:57-65, 6:16-23 (“An exemplary compression profile for a television video stream would feature a main level, main profile MPEG-2 compression method with frame groups of 12 frames: IBB PBB PBB PBB. The method would feature progressive encoding, or deinterlacing, and low pass filtering. The motion vectors would be 32×32 for the P frames and 16×16 for the B frames.”). By disclosing setting various compression parameters, Dvir is disclosing using information from the selected profile in the compression step.

136. Dvir also explains that the preferred encoding scheme uses an MPEG compressor. According to Dvir, “[o]nce the proper compression profile for the display data is selected, the actual process of compression is performed by an [MPEG] encoder 11 or other type of compression algorithm.” Ex. 1007 at 5:14-17. Dvir explains that MPEG is well-suited for implementing Dvir’s techniques in part because of MPEG’s defined profiles and levels:

The compression profile would be adjusted according to such factors as the maximum resolution, refresh rate and color handling. Optionally and preferably, for text data, a variable bit rate is used for the compression, since the amount of text data which must be transmitted at any particular moment is itself variable. Therefore, the MPEG compression methods are preferred for the present invention as they feature different profiles and levels which are adjusted according to these different factors. The MPEG encoder is also preferred as it enables noise to be filtered through different “filters,” such as low-pass, median and deinterlacing filters. The motion vector may also be set, for example by enlarging or minimizing the search area of the data which has changed position within the frame.

Ex. 1007 at 5:51-65.

137. MPEG compressors utilize asymmetric data compression as that term is used in the ’535 patent. MPEG compression schemes had been described as being

“notoriously asymmetric.” *See* Ex. 1010 at p.7. And, numerous reliable publications describe the asymmetric nature of MPEG encoding based on the complexity of MPEG encoders when compared with MPEG decoders. *See, e.g.*, Ex. 1008 at p.1 (“MPEG uses an asymmetric coding model where encoding requires substantially more computational power than decoding.”); Ex. 1009 at p.4 (“the MPEG algorithm is notoriously asymmetric”); Ex. 1011 at p.1 (“MPEG is a asymmetric codec.”); Ex. 1012 at p.1 (“MPEG is asymmetric”); Ex. 1022 at 1:66-2:11 (As with most interframe compression schemes, MPEG is asymmetric—compression requires more effort than decompression.”)..

138. Based on the foregoing, and my reading of Dvir as a whole from the perspective of a person of ordinary skill in the art, Dvir discloses “compressing at least a portion of the data block with one or more compressors using asymmetric data compression and information from the selected access profile” as required by claim 1 of the ’535 patent. *See* Ex. 1001, cl.1.

i. As an Alternative, Dvir and Koz Render Obvious
this Limitation

139. As I discussed above, Dvir explains that its preferred encoder for use in its system is “the MPEG group of compression methods.” Ex. 1007, 5:17-22.

140. Dvir does not explain in depth the details of MPEG encoding. A POSITA would understand this was because MPEG encoding and decoding was a well-known technology by the late 1990’s. Indeed, the MPEG specifications were

publicly released and known to those of skill in the art. Thus, a person of ordinary skill in the art would have understood that MPEG compression was asymmetric without needing to look to any other references.

141. However, to the extent a person of ordinary skill wished to learn more details about the MPEG encoding used in Dvir, they would have been motivated to turn to a reference like Koz, which describes certain implementation details of MPEG encoding not specifically explained in Dvir.

142. Similar to Dvir, Koz describes a system that uses MPEG encoding. Specifically, Koz explains that MPEG encoding is asymmetric: “MPEG is asymmetric—compression requires more effort than decompression.” Ex. 1022, 2:8-10.

143. Use of MPEG encoding is expressly suggested in both Dvir and Koz, and thus a person of ordinary skill in the art would have been motivated to combine the details of MPEG encoding in Koz with the system disclosed in Dvir. A person of ordinary skill in the art would have found implementing these known techniques in known systems for their intended purposes routine and would not have been presented with any unexpected results. Indeed, using these features disclosed in the prior art would have not required anything more than ordinary skill in the art and a person of ordinary skill in the art would not have been faced with any unexpected results.

- e. [1[C][ii]]: “the information being indicative of one or more compressors to apply to the at least the portion of the data block.”

144. Claim 1 requires that “the information [from the selected access profile] be[] indicative of one or more compressors to apply to the at least the portion of the data block.” Ex. 1001, cl.1. A person of ordinary skill in the art would have understood that this limitation is disclosed by Dvir too.

145. For example, Dvir discusses “analyzing each type of multimedia data to determine at least one characteristic of each type of multimedia data” and “associating one of a plurality of different multimedia data compression procedures with each type of multimedia data according to the at least one characteristic for optimal compression of the multimedia data to form the compression profile.” Ex. 1007 at 3:11-18. Dvir further notes that, “[f]or example, the presence of thousands of unique colors in a frame with considerable movement between frames, as well as unchanged black stripes at the bottom and top of each frame, would indicate that a DVD movie is being transmitted. The appropriate compression profile for the DVD movie would then be selected.” *Id.* at 5:45-51. And, Dvir notes that when, for example, the data blocks are determined to represent a television video stream, the profile indicates that “progressive encoding” should be applied to the data block. Ex. 1007, 6:20-21.

146. A person of ordinary skill in the art would have understood that each compression profile contains information that maps “at least one characteristics of each type of multimedia data” to “one of a plurality of different multimedia data compression procedures” and thus compressors. Ex. 1007 at 3:14-18. Without this, a compression profile would not be able to select a compression procedure (i.e., a compressor) based on characteristics of data. By teaching that “different data compression procedures” are associated with different types of video data according to characteristics of the data “to form the compression profile” Dvir teaches that information in the compression profile (see my discussion of the information in the profile above) indicates the data compressor to apply to that data block. *See id.*, 2:28-34, 2:64-3:3 (“providing a plurality of different multimedia compression procedures, each of the compression procedures being associated with a profile of characteristics of the multimedia data”), 5:3-13 (“a plurality of compression profiles, each of which is suitable for a particular type of display data which is produced by a software application”). Thus, compression is performed using information in the profile that is indicative of one or more compressors to apply (e.g. a “progressive encoder”).

147. Based on the foregoing, and my reading of Dvir as a whole from the perspective of a person of ordinary skill in the art, Dvir discloses “the information

being indicative of the one or more compressors to apply to the at least the portion of the data block” as required by claim 1 of the ’535 patent. *See* Ex. 1001, cl.1.

5. *Claim 2 is Anticipated by Dvir, or, In the Alternative, Would Have Been Obvious Over the Combined Teachings of Dvir and Koz as Understood By a POSITA*

148. Claim 2 recites:

[2[P]] The method of claim 1,

[2[A]] wherein the data block is from among a plurality of data blocks, and

[2[B]] wherein the compressing comprises: compressing the plurality of data blocks to create the one or more compressed data blocks.

Ex. 1001, cl.2.

149. Dvir discloses all aspects of claim 2 of the ’535 patent. Therefore, Dvir “anticipates” claim 2, or, in the alternative, Dvir and Koz render obvious claim 2.

a. [2[P]]: “The method of claim 1,”

150. Dvir (with or without Koz) discloses the method of claim 1 as I have explained above.

b. [2[A]]: “wherein the data block is from a plurality of data blocks, and”

151. Claim 2 requires that “the data block [be] from a plurality of data blocks.” Ex. 1001, cl.2. A person of ordinary skill in the art would have understood that this aspect of claim 2 is disclosed by Dvir.

152. As I have already explained, Dvir’s data blocks include, for example, one or two video data frames. A person of ordinary skill in the art reading Dvir would have understood that Dvir discloses that such data blocks are part of a stream of uncompressed video data from a particular software application. *See id.* at 5:23-26 (“For example, different compression profiles would be required for television video stream, a word processing screen stream, a three-dimensional video game video stream, and so forth.”). For example, a person of ordinary skill in the art would have understood that there are a large number of video data frames in even one second of video data and that a video stream that depicts, for example, a DVD movie would have a large number of frames—and thus a plurality of frames. By way of illustration, at a frame rate of 24 fps, a 2-hour DVD movie would include 172,800 frames of video data. Indeed, no person of ordinary skill in the art would have read Dvir’s disclosure of a DVD movie or a “television video stream” to include only $1/12^{\text{th}}$ or $1/24^{\text{th}}$ of a second of video data (and thus only a single data block). Instead, a person of ordinary skill in the art would have understood that Dvir was disclosing that the one or two sampled frames are part of a larger set of video data blocks that define a video data stream. *See, e.g.,* Ex. 1007 at 2:28 (“streaming video data for a DVD movie”); 5:24-25 (“television video stream”).

153. Based on the foregoing, and my reading of Dvir as a whole from the perspective of a person of ordinary skill in the art, Dvir discloses that “the data block

is from a plurality of data blocks,” as required by claim 2 of the ’535 patent. *See* Ex. 1001, cl.2.

- c. [2[B]]: “wherein the compressing comprises: compressing the plurality of data blocks to create the one or more compressed data blocks.”

154. Claim 2 requires that the “compressing comprises [] compressing the plurality of data blocks to create one or more compressed data blocks.” Ex. 1001, cl.2. A person of ordinary skill in the art would have understood that this limitation is disclosed by Dvir too.

155. A person of ordinary skill in the art would have understood that Dvir discloses compressing at least a portion of the data block with one or more compressors using asymmetric data compression and information from the selected access profile as I explained in connection with my discussion of limitation 1[C][i], above. A person of ordinary skill in the art would have understood that compressing data blocks creates one or more compressed data blocks. For example, Dvir explains that the result of MPEG compression is a group of MPEG frames, which those skilled in the art also refer to as a “group of pictures” or “GOP.” *See* Ex. 1007 at 5:65-6:4 (“Regardless of the level and profile, the MPEG format uses three different types of frames: I, B and P frames. The I frame is the initial or “intra-frame” and is required. The B frame is a bi-directional frame, while the P frame is a predictable frame. The B and P frames are optional, and B frames can be removed without P

frames.”). The MPEG encoder therefore outputs a number of compressed data blocks—units of data—that are then transmitted to the remote device for viewing on a remote display after decoding the data. *See* Ex. 1007, 7:1-37.

156. Each MPEG frame represents compressed video data. *See id.* at 4:66-5:3 (“Once compression profile manager 7 has received the pertinent information concerning the type of video display data which is being produced, compression profile manager 7 can select the particular type of video compression method for compressing the display data.”). And each MPEG GOP is a single unit of data, because it includes a unit of compressed video data within a video stream. *See id.* at 6:5-15. Thus, the MPEG encoder outputs compressed data blocks.

157. And, as I explained above in my analysis of limitation [2[A]], a person of ordinary skill in the art would have understood that Dvir discloses compressing streams of video data that include a plurality of data blocks.

158. Based on the foregoing, and my reading of Dvir as a whole from the perspective of a person of ordinary skill in the art, Dvir discloses “compressing comprises [] compressing the plurality of data blocks to create one or more compressed data blocks,” as required by claim 2 of the ’535 patent. *See* Ex. 1001, cl.2.

6. *Claim 9 is Anticipated by Dvir, or, In the Alternative, Would Have Been Obvious Over the Combined Teachings of Dvir and Koz as Understood By a POSITA*

159. Claim 9 refers back to claim 1. *See* Ex. 1001, cl.9. I have already explained how Dvir (with or without Koz) discloses each aspect of the method of claim 1.

160. Claim 9 further requires that “the determining of the parameter or attribute of the at least the portion of the data block excludes determining based only upon reading a descriptor of the at least the portion of the data block.” *Id.* Dvir also discloses this feature.

161. As I have explained above, Dvir discloses determining parameters or attributes of video data after “sampling a group of rasters” (also referred to as 8 x 8 block of pixels) of video data from one or more frames of video data. *See* Ex. 1007 at 5:30-34. A person of ordinary skill in the art would have understood that, by determining parameters or attributes of video data after “sampling a group of rasters,” including determining “a number of unique colors in the screen, a presence of static dark thin rows of pixels or large static blocks, and a level of motion in the screen between one frame and the next frame,” *id.* at 5:36-41, this is not determining parameters or attributes of the video data by reading a descriptor, but is instead determining parameters or attributes from the data itself.

162. Based on the foregoing, and my reading of Dvir as a whole from the perspective of a person of ordinary skill in the art, Dvir discloses that “determining of the parameter or attribute of the at least the portion of the data block excludes determining based only upon reading a descriptor of the at least the portion of the data block,” as required by claim 9 of the ’535 patent. Ex. 1001, cl.9.

7. *Claim 10 is Anticipated by Dvir, or, In the Alternative, Would Have Been Obvious Over the Combined Teachings of Dvir and Koz as Understood By a POSITA*

163. Claim 10 refers back to claim 1. See Ex. 1001, cl.10. I have already explained how Dvir (with or without Koz) discloses each aspect of the method of claim 1.

164. Claim 10 further requires that “the at least the portion of the data block is from among a plurality of data blocks.” *Id.* I have already explained how Dvir discloses that the at least the portion of the data block is from among a plurality of data blocks in connection with my analysis of claim 2 since this language appears verbatim in that claim too.

165. Claim 10 of the ’535 patent further requires that “the compressing comprises: compressing at least a portion of the plurality of data blocks with the one or more compressors using the asymmetric data compression and the information to create one or more compressed data blocks.” Ex. 1001, cl.10. I have already explained how Dvir discloses that compressing includes compressing with one or

more compressors using asymmetric data compression and the information (from the access profile) in connection with my analysis of limitation [1[C][i], above. And, I have further explained how the result of that compression leads to the creation of one or more compressed data blocks in connection with my discussion of claim 2 as well.

166. Therefore, a person of ordinary skill in the art reading Dvir as a whole would have understood Dvir as disclosing all aspects of claim 10 of the '535 patent for the reasons I explained in connection with my analysis of claims 1 and 2, above.

8. *Claim 14 is Anticipated by Dvir, or, In the Alternative, Would Have Been Obvious Over the Combined Teachings of Dvir and Koz as Understood By a POSITA*

167. Claim 14 recites:

[14[P]] A method, comprising:

[14[A]] determining a parameter or attribute of at least a portion of a data block;

[14[B]] selecting an access profile from among a plurality of access profiles based upon the determined parameter or attribute; and

[14[C][i]] compressing the at least the portion of the data block with one or more compressors utilizing information from the selected access profile to create one or more compressed data blocks, [14[C][ii]] the information being

indicative of the one or more compressors to apply to the at least the portion of the data block,

[14[D]] wherein the one or more compressors utilize at least one slow compress encoder and at least one fast decompress decoder, and [14[E]] wherein compressing the at least the portion of the data block with the at least one slow compress encoder takes more time than decompressing the at least the portion of the data block with the at least one fast decompress decoder if the time were measured with the at least one slow compress encoder and the at least one fast decompress decoder running individually on a common host system.

Ex. 1001, cl.14.

168. Dvir discloses every limitation of claim 14. Thus, Dvir alone anticipates claim 14. However, if one were to argue that Dvir does not expressly disclose that MPEG compression involves a slow compress encoder and fast decompress decoder, then as an alternative it is my further opinion that the combination of Dvir and Koz renders obvious claim 14 for the reasons I explain below for claim element [14[d]].

a. [14[P]]: “A method, comprising:”

169. I have not been asked to render an opinion as to whether the preamble—i.e., the language “[a] method comprising”—limits claim 14. Nevertheless, for the

reasons I explained in connection with my discussion of the preamble of claim 1 (element 1[P]), Dvir discloses this aspect of claim 14.

- b. [14[A]]: “determining a parameter or attribute of at least a portion of a data block;”

170. This limitation of claim 14 is the same as limitation [1[A]] of claim 1. I have explained how Dvir discloses this aspect of claim 14 in connection with my analysis of limitation [1[A]], above.

- c. [14[B]]: “selecting an access profile from among a plurality of access profiles based upon the determined parameter or attribute; and”

171. This limitation of claim 14 is the same as limitation [1[B]] of claim 1. I have explained how Dvir discloses this aspect of claim 14 in connection with my analysis of limitation [1[B]], above.

- d. [14[C][i]]: “compressing the at least the portion of the data block with one or more compressors utilizing information from the selected access profile to create one or more compressed data blocks,”

172. This limitation of claim 14 is the same as limitation [1[C][i]] of claim 1. I have explained how Dvir discloses this aspect of claim 14 in connection with my analysis of limitation 1[C][i], above.

- e. [14[C][ii]]: “the information being indicative of the one or more compressors to apply to the at least the portion of the data block,”

173. This limitation of claim 14 is the same as limitation [1[C][ii] of claim

1. I have explained how Dvir discloses this aspect of claim 14 in connection with my analysis of limitation 1[C][ii], above.

- f. [14[D]]: “wherein the one or more compressors utilize at least one slow compress encoder and at least one fast decompress decoder; and”

174. Claim 14 requires that “the one or more compressors utilize at least one slow compress encoder and at least one fast decompress decoder.” Ex. 1001, cl.14. A person of ordinary skill in the art would have understood that this limitation is disclosed by Dvir too.

175. As explained above, Dvir discloses the use of an MPEG encoder. *See, e.g.*, Ex. 1007, Fig. 1a (item 11), Fig. 3a (item 42), 5:14-16, 5:57-65, 6:5-10, 8:17-25. Those skilled in the art were well aware that MPEG was a “notoriously asymmetric” compression scheme. Ex. 1010 at p.7. MPEG encoders were understood to be much more complex than MPEG decoders. *See, e.g.*, Ex. 1008 at p.1 (“MPEG uses an asymmetric coding model where encoding requires substantially more computational power than decoding.”); Ex. 1009 at p.4 (“the MPEG algorithm is notoriously asymmetric”); Ex. 1011 at p.1 (“MPEG is a asymmetric codec.”); Ex. 1012 at p.1 (“MPEG is asymmetric”); Ex. 1022 at 1:66-

2:11 (“As with most interframe compression schemes, MPEG is asymmetric—compression requires more effort than decompression.”). Because the MPEG encoding process was more computationally intensive, and required “more effort” than decoding, a person of ordinary skill in the art would have understood that the compressors used in Dvir (i.e., MPEG compressors) utilize at least one slow compress encoder and one fast decompress decoder.

176. Based on the foregoing, and my reading of Dvir as a whole from the perspective of one of ordinary skill in the art, Dvir discloses that “the one or more compressors utilize at least one slow compress encoder and at least one fast decompress decoder” as required by claim 14 of the ’535 patent. Ex. 1001, cl.14.

177. As I explained above for claim element [1[C][i]], to the extent a person of ordinary skill in the art wanted to learn more implementation details about MPEG encoding, they would have been motivated to turn to a reference like Koz. Koz explains that MPEG compression is asymmetric and that “compression requires more effort than decompression.” Ex. 1022, 2:8-10. Thus, Koz discloses that for MPEG encoding, the compression is “slow” relative to the decoding, which is comparatively “fast.” The combination of Koz and Dvir would therefore render obvious this limitation, as an alternative.

- g. [14[E]]: “wherein compressing the at least the portion of the data block with the at least one slow compress encoder takes more time than decompressing the at least the portion of the data block with the at least one fast decompress decoder if the time were measured with the at least one slow compress encoder and the at least one fast decompress decoder running individually on a common host system.”

178. Claim 14 also requires that “compressing the at least the portion of the data block with the at least one slow compress encoder takes more time than decompressing the at least the portion of the data block with the at least one fast decompress decoder if the time were measured with the at least one slow compress encoder and the at least one fast decompress decoder running individually on a common host system.” Ex. 1001, cl.14. A person of ordinary skill in the art reading this language from claim 14 would not have understood the claim to require that the compression and decompression occur using a “common host system,” but instead that this limitation is directed to setting up an “apples-to-apples” comparison of the compression time when compared to the decompression time for the at least the portion of the data block. Dvir’s use of MPEG encoding discloses this feature as well.

179. As I explained in connection with my analysis of limitation 14[D], Dvir discloses the use of MPEG compressors, which include a fast decoder, but a slow encoder. A person of ordinary skill in the art would have understood that if MPEG compression (encoding) and decompression (decoding) were performed on a

common host system, the encoding process would take more time than the decoding process. This feature of MPEG was notoriously well known due to the complexity of the interframe coding used in MPEG and the need to search for appropriate motion vectors across multiple frames of video data. Ex. 1010 at p.7; *see also*, Ex. 1008 at p.1 (“MPEG uses an asymmetric coding model where encoding requires substantially more computational power than decoding.”); Ex. 1009 at p.4 (“the MPEG algorithm is notoriously asymmetric”); Ex. 1011 at p.1 (“MPEG is a asymmetric codec.”); Ex. 1012 at p.1 (“MPEG is asymmetric”); Ex. 1022 at 1:66-2:11 (“As with most interframe compression schemes, MPEG is asymmetric—compression requires more effort than decompression.”).

180. Based on the foregoing, my explanation about how MPEG was understood to be an asymmetric compression technique elsewhere in this declaration, and my reading of Dvir as a whole from the perspective of a person of ordinary skill in the art, Dvir discloses “compressing the at least the portion of the data block with the at least one slow compress encoder takes more time than decompressing the at least the portion of the data block with the at least one fast decompress decoder if the time were measured with the at least one slow compress encoder and the at least one fast decompress decoder running individually on a common host system” as required by claim 14 of the ’535 patent. Ex. 1001, cl.14.

181. Additionally, as I explained above for claim elements [1[C][i]] and [14[D]], as an alternative the combination of Dvir and Koz would disclose this claim limitation because Koz provides further details on MPEG encoding, including that MPEG compression is asymmetric, with slower compression than decompression.

B. Claims 3, 4, and 11, are Anticipated by Dvir, or, In the Alternative, Would Have Been Obvious Over the Combined Teachings of Dvir (With or Without Koz) and Ando as Understood By A Person of Ordinary Skill In The Art

182. Based on my review and analysis of the materials cited herein, my opinions regarding the understanding of a person of ordinary skill in the art in February 2001, and my training and experience, it is my opinion that Dvir anticipates claims 3, 4, and 11 of the '535 patent, or, in the alternative, that Dvir (with or without Koz) and Ando render obvious claims 3, 4, and 11 of the '535 patent. The reasons for my conclusion are explained more full below.

1. Assumptions

183. For the purposes of my analysis, I have been informed that Dvir, Koz, and Ando are prior art to the '535 patent and I have assumed that information is correct for the purposes of my analysis.

2. Overview of Dvir

184. I have summarized Dvir in connection with my analysis of anticipation of certain claims of the '535 patent above and I refer to that discussion here.

3. *Overview of Koz*

185. I have summarized Koz in connection with my analysis of certain claims of the '535 patent above and I refer to that discussion here.

4. *Overview of Ando*

186. Ando describes a system for recording video data to a storage medium. Specifically, Ando provides a description of certain parts of the Digital Versatile Disk ("DVD") standard, which relies on the MPEG standard used in Dvir. Ex. 1026 at 1:25-28 ("the DVD (Digital Versatile Disk) standard employing the internationally standardized MPEG-2 scheme").

187. Ando explains that video data is compressed and stored on a DVD in one or more files. Ex. 1026, 1:25-36, 1:61-67 ("[T]he directory structure of information (data files) recorded on an information storage medium is such that a subdirectory of video title set VTS . . . [is] connected to a root directory as shown in FIG. 1."), 2:7-17, 3:30-35, 3:47-51 ("control data and video data are recorded in such a manner that they are distributed over plural files"), 4:1-6, FIG. 1.

5. *Motivation to Combine Dvir (With or Without Koz) and Ando*

188. Dvir explains that the video to be compressed may be a DVD video stream. Ex. 1007, 2:24-31, 5:45-51, 6:62-67. As Dvir notes, DVD was one of several formats commonly used to store files. Ex. 1007, 1:22-27 ("[C]omputers today can play music stored in a variety of formats, including files stored in the MP3

format on a CD, on a magnetic storage medium, or on the DVD storage medium as well as displaying video streams . . .”).

189. Dvir does not explain in depth the details of DVD storage. A POSITA would understand this was because DVD was a well-known technology by the late 1990’s. Thus, a person of ordinary skill in the art would have understood that DVDs involved storing video data as files without needing to look to any other references.

190. However, to the extent a person of ordinary skill wished to learn more details about the DVD storage referenced in Dvir, they would have been motivated to turn to a reference like Ando, which describes certain implementation details of DVDs not specifically explained in Dvir.

191. Similar to Dvir, Ando describes a system that uses DVD storage. Specifically, Ando explains that DVD video data is stored on a DVD as one or more files. Ex. 1026, 1:25-36, 1:61-67 (“[T]he directory structure of information (data files) recorded on an information storage medium is such that a subdirectory of video title set VTS . . . [is] connected to a root directory as shown in FIG. 1.”), 2:7-17 , 3:30-35, 3:47-51 (“control data and video data are recorded in such a manner that they are distributed over plural files”), 4:1-6, FIG. 1.

192. Use of DVDs is expressly suggested in both Dvir and Ando, and thus a person of ordinary skill in the art would have been motivated to combine the details of DVD storage in Ando with the system disclosed in Dvir. A person of ordinary

skill in the art would have found implementing these known techniques in known systems for their intended purposes routine and would not have been presented with any unexpected results. Indeed, using these features disclosed in the prior art would have not required anything more than ordinary skill in the art and a person of ordinary skill in the art would not have been faced with any unexpected results.

6. *Claim 3 is Anticipated by Dvir, or, In the Alternative, Would Have Been Obvious Over the Combined Teachings of Dvir (With or Without Koz) and Ando as Understood By A Person of Ordinary Skill In The Art*

193. Claim 3 of the '535 patent refers back to claim 2. I have already explained above why Dvir (with or without Koz) discloses all aspects of claim 2 (and claim 1, which is incorporated into claim 2 as well). Claim 3 of the '535 patent further requires that “the plurality of data blocks comprises: one or more files.” Ex. 1001, cl.3. Dvir also discloses this feature. Dvir discloses that the plurality of data blocks may be a DVD stream, and a person of ordinary skill in the art would have understood that a DVD includes one or more files stored in the DVD format on a DVD storage media. *See* Ex. 1007 at 1:22-27 (“In addition to the functions of earlier computers, computers today can play music stored in a variety of formats, including files stored in the MP3 format on a CD, on magnetic storage medium or on the DVD storage medium, as well as displaying video streams and enabling “chats” to take place through the Internet.”); 5:45-50 (referring to DVD movies) . A person of ordinary skill in the art would have understood that data on DVD is stored in one or

more files; indeed Dvir expressly says as much. *See id.* at 1:22-26 (“In addition to the functions of earlier computers, computers today can play music stored in a variety of formats, including files stored ... on the DVD storage medium ...”). Thus, when a stream of DVD data is input into Dvir’s compression system, a person of ordinary skill in the art would have understood that the plurality of data blocks define a file stored on a DVD.

194. Based on the foregoing, and my reading of Dvir as a whole from the perspective of a person of ordinary skill in the art, Dvir discloses that “the plurality of data blocks comprise: one or more files” as required by claim 3 of the ’535 patent. Ex. 1001, cl.3.

195. In my opinion, Dvir alone discloses this limitation. However, as I explained above, if a POSITA wanted more information on the implementation of DVDs, they would have been motivated to combine Dvir (with or without Koz) with a reference like Ando.

196. Ando discloses that DVD data is compressed and stored on a DVD disc as one or more files. Ex. 1026, 1:25-36, 1:61-67 (“[T]he directory structure of information (data files) recorded on an information storage medium is such that a subdirectory of video title set VTS . . . [is] connected to a root directory as shown in FIG. 1.”), 2:7-17 , 3:30-35, 3:47-51 (“control data and video data are recorded in such a manner that they are distributed over plural files”), 4:1-6, FIG. 1.

197. Thus, it would have been obvious to one of skill in the art to use Dvir systems on DVD movies, as explicitly disclosed by Dvir, which had been stored as a standard DVD as one more files, as explained by Ando.

7. *Claim 4 is Anticipated by Dvir, or, In the Alternative, Would Have Been Obvious Over the Combined Teachings of Dvir (With or Without Koz) and Ando as Understood By A Person of Ordinary Skill In The Art*

198. Claim 4 refers back to claim 1. *See* Ex. 1001, cl.4. I have already explained how Dvir (with or without Koz) discloses each aspect of the method of claim 1. Claim 4 further requires that “the one or more compressed data blocks comprise: one or more files.” Ex. 1001, cl.4. Dvir also discloses this feature.

199. Dvir discloses that an input to an MPEG compressor can include one or more files, as I explained in connection with my discussion of claim 3, above. The citations to Dvir above are equally applicable to my analysis of claim 4. Based on those passages from Dvir, A person of ordinary skill in the art would have understood that since the input into Dvir’s MPEG encoder includes files the compressed output (which is a compressed version of the files) is a compressed version of that same file. In other words, when Dvir receives as an input an uncompressed video stream that comprises a file, the resulting compressed output video stream also includes that same file, but in a compressed form.

200. Based on the foregoing, and my reading of Dvir as a whole from the perspective of a person of ordinary skill in the art, Dvir discloses that “the one or

more compressed data blocks [] comprise one or more files” as required by claim 4 of the ’535 patent. Ex. 1001, cl.4.

8. *Claim 11 is Anticipated by Dvir, or, In the Alternative, Would Have Been Obvious Over the Combined Teachings of Dvir (With or Without Koz) and Ando as Understood By A Person of Ordinary Skill In The Art*

201. Claim 11 refers back to claim 10, which itself refers back to claim 1. I have already explained how Dvir (with or without Koz) discloses all aspects of the method of claims 1 and 10. Claim 11 further requires that “the plurality of data blocks or the one or more compressed data blocks comprise: at least a portion of a file.” Ex. 1001, cl.11. This claim, therefore, covers either of two scenarios: (1) the “plurality of data blocks” comprises “at least a portion of a file” and (2) the “one or more compressed data blocks comprise: at least a portion of a file.” *Id.* Dvir also discloses this feature under either alternative for the reasons I explained with respect to claim 3 (“the plurality of data blocks comprises: one or more files”) and claim 4 (the one or more compressed data blocks comprise: one or more files”). While the language of claim 11 is different than claims 3 and 4, it calls for “at least a portion of a file,” and thus by disclosing a file, Dvir is also disclosing “at least a portion” of that file.

202. Based on the foregoing, and my reading of Dvir as a whole from the perspective of a person of ordinary skill in the art, Dvir discloses that the plurality

of data blocks or the one or more compressed data blocks comprise: at least a portion of a file” as required by claim 11 of the ’535 patent. Ex. 1001, cl.11

C. Claims 5-6, 12, 15-17, 19, and 22 Would Have Been Obvious Over the Combined Teachings of Dvir (With or Without Koz) and Hamadani as Understood By a POSITA

1. Assumptions

203. For the purposes of my analysis, I have been informed that Dvir and Hamadani are prior art to the ’535 patent and I have assumed that information is correct for the purposes of my analysis.

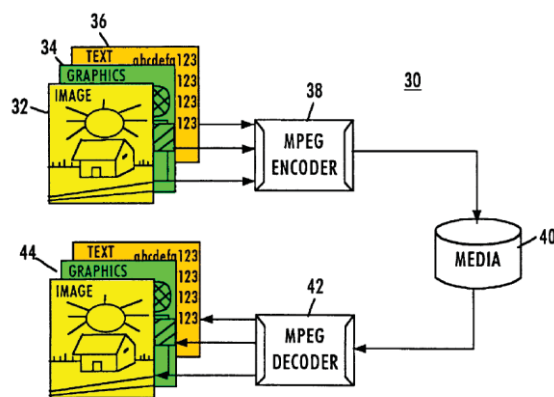
2. Overview of Dvir and Koz

204. I have summarized Dvir and Koz above and I refer to that discussion here.

3. Overview of Hamadani

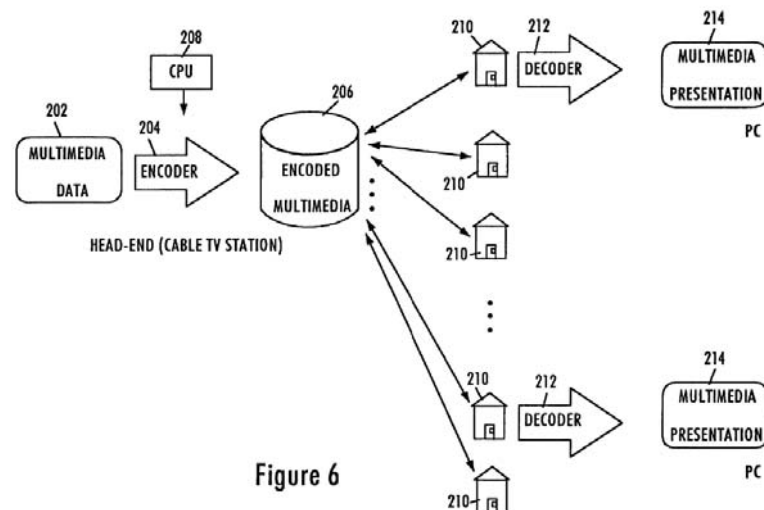
205. Hamadani is directed to a system for compressing, transmitting, decompressing, and displaying multimedia data for example on a remote display. *See, e.g.*, Ex. 1013, Fig. 6, 7:48-8:11. In this way, Hamadani and Dvir would have been understood to solve interrelated problems—namely the need to compress video data before that data may be transmitted to a remote location for decoding and display. Hamadani discloses “a multimedia data encoding and decoding system capable of handling various types of data arranged in variable-size blocks.” Ex. 1013 at Abst. The multimedia system includes an MPEG encoder and an MPEG decoder: the “MPEG encoder 38 compresses the supplied multimedia data in

accordance with the well-known MPEG compression algorithm,” *id.* at 3:60-63, while the “MPEG decoder 42 decompresses the compressed video data in accordance with the well-known MPEG decompression algorithm, and supplies them to a multimedia monitor 44 that displays the decompressed image, graphics and text data,” *id.* at 3:65-4:2. After compression, “[t]he compressed multimedia data may be loaded into a data storage 40 or supplied through a communication channel to a remote user.” *Id.* at 3:62-65. An exemplary system for performing Hamadani’s methods is shown below (shading added).



Ex. 1013 at Fig. 2, 3:38-39 (“FIG. 2 is a block-diagram of an MPEG encoding and decoding system of the present invention.”). Hamadani’s system is equipped to compress different types of video data ranging from “image” to “graphics” to “text,” in what Hamadani refers to as “multimedia data.” *See, e.g.*, Ex. 1013, 2:35-38, 2:52-57, 3:62-65, 4:8-16, 4:19-22, Fig. 2 (shaded above to show different types of video data that is input into the MPEG compression system disclosed by Hamadani).

206. Hamadani states that the disclosed invention “may be used for handling multimedia data in a personal computer, for supplying remote users with multimedia data from a central location, or for other applications that require a substantial amount of multimedia data to be processed.” Ex. 1013 at 4:2-7. One of the use cases of the multimedia system in Hamadani is a “video-on-demand service.” *Id.* at 8:10-12. FIG. 6 depicts “application of the multimedia encoding and decoding system of the present invention to a video-on-demand service.” *Id.* 3:46-47.



Id. at Fig. 6.

207. This figure shows that at a “head-end” or “cable TV station” “image, graphics and text data from a multimedia data source 202 are compressed by a MPEG encoder 204 in accordance with the MPEG standards.” *Id.* at 7:51-54. After compression, “[t]he compressed data may be stored in an encoded multimedia storage 206.” *Id.* at 7:54-57.

208. “The central location is connected via TV cables or telephone lines to a plurality of peripheral locations 210,” each of which has an “MPEG decoder 212” and “a personal computer (PC) 214 capable of presenting multimedia information.” *Id.* at 7:58-62. Thus, “[w]hen a user at one of the peripheral locations 208 sends a request for the multimedia data stored in the multimedia storage 206, the CPU 208 enables the MPEG decoder 212 associated with the user to read the requested data from the storage 206.” *Id.* at 7:62-66. After transmission of the compressed data, “[t]he MPEG decoder 212 decompresses the compressed image, graphics and text data, and supplies them to the PC 214 for displaying.” *Id.* at 8:4-6. A person of ordinary skill in the art therefore would have understood that Hamadani discloses a system in which MPEG compressed multimedia data may be stored, transmitted, decoded, and displayed remotely by a user.

4. *Motivation to Combine Dvir (With or Without Koz) and Hamadani*

209. As I described above, both Hamadani and Dvir describe systems using MPEG encoders. *See, e.g.*, Ex. 1013 at 3:60-63; Ex. 1007 at 5:14-17. Koz likewise provides details of MPEG encoding. Ex. 1022 at 12:33-61.

210. Those of ordinary skill in the art were well aware that MPEG compression systems were commonly used in connection with the compression of raw video data before storage as is taught in Hamadani. Indeed, MPEG-1 was developed with the goal of facilitating storage of video data, and MPEG-2 was

developed with the goal of facilitating both storage and transmission of video data. *See* Ex. 1017 at p.4.

211. As reflected in Hamadani (as I discuss above), it was also understood that storing compressed data prior to transmission to a remote location would have had a number of benefits. First, in a system in which data was to be stored, compression would increase storage density of the storage medium. *See* Ex. 1013 at 1:16-20. Additionally, compression would have had the benefits of reducing transmission bandwidth needs. Additionally, given the complexity of MPEG encoders, by allowing storage of the data instead of attempting to transmit the compressed data without storage, more time-intensive compression techniques can be used because the system designer would not need to be concerned with keeping the transmission at real-time for the remote user. Instead, the video data could be compressed and stored and made available after the entire video content is compressed. Storage of compressed data would also have had the ability to allow a user to request the compressed data to be sent to a remote location on-demand at the end-user's convenience. These benefits of using storage of compressed data before transmission would have led a person of ordinary skill in the art to implement a system in which multimedia data was compressed and stored for later play-back by the end user using the techniques for selecting the appropriate profile for the type of

multimedia data taught by Dvir (with or without Koz) along with a multimedia video data distribution system such as that disclosed by Hamadani.

212. A person of ordinary skill in the art would have found implementing these known techniques in known systems for their intended purposes routine and would not have been presented with any unexpected results. Indeed, using these features disclosed in the prior art would have not required anything more than ordinary skill in the art and a person of ordinary skill in the art would not have been faced with any unexpected results.

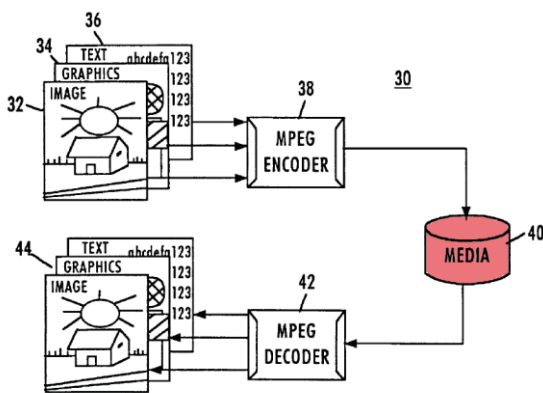
5. *Claim 5 Would Have Been Obvious Over the Combined Teachings of Dvir (With or Without Koz) and Hamadani as Understood By a POSITA*

213. Claim 5 refers back to claim 1. *See* Ex. 1001, cl.5. I have already explained how Dvir (with or without Koz) discloses each aspect of the method of claim 1.

214. Claim 5 further requires a step of “storing at least a portion of the one or more compressed data blocks in the one or more files.” *Id.* While Dvir does not expressly mention storing compressed data blocks before they are transmitted to a remote location, storing the compressed data blocks before transmitting them would have been an obvious technique to implement in an MPEG compression system that compressed multimedia data such as those disclosed by both Dvir and Hamadani.

Therefore, for the following reasons claim 5 would have been obvious to a person of ordinary skill in the art.

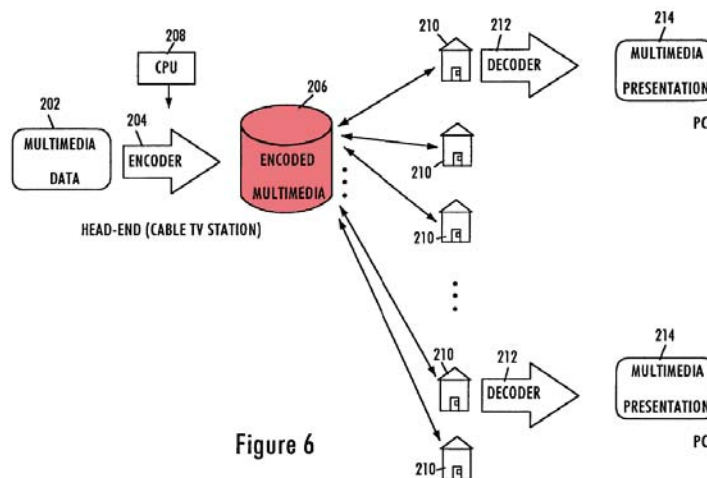
215. Hamadani discloses storage of compressed data. In discussing prior art, Hamadani notes that the compressed video “image data may be loaded into a local video storage for further retrieval by a local or remote user.” Ex. 1013 at 1:51-53. Hamadani further explains that “MPEG encoder 38 compresses the supplied multimedia data in accordance with the well-known MPEG compression algorithm,” the “compressed multimedia data may be loaded into a data storage 40 or supplied through a communication channel to a remote user.” *Id.* at 4:60-65. This is illustrated in the figure below where the storage medium has been highlighted in red.



Ex. 1013 at Fig. 2 (annotated with storage media shown in red).

216. Another example in which Hamadani shows storage of compressed data is in Figure 6. Hamadani explains that in the context of video-on-demand services after MPEG encoding, “[t]he compressed data may be stored in an encoded

multimedia storage 206.” *See id.* at 7:54-56. This is reflected in Figure 6 below which has the data storage highlighted in red.



Ex. 1013 at Fig. 6 (annotated with storage media shown in red).

217. Hamadani’s disclosure reflects the larger understanding by people of ordinary skill in the art in February 2001: that MPEG compression could be used in systems that stored data and systems that were used to transmit compressed data. *See, e.g.*, Ex. 1013, 1:13-20 (“Data compression may be provided in data processing systems to reduce the time of data transmission in communication links or to transmit broad-bandwidth signals via narrow-bandwidth communication channels. Also, data compression may be used to increase the quantity of data that can be stored in a given space, or to decrease the space needed to store a given quantity of data.”). These were well-understood uses of MPEG compression and there was nothing inventive about storing an MPEG-compressed video stream rather than transmitting it without storage. Storing MPEG data to gain the benefit of increased

storage densities was simply not new by February 2001, as shown, for example, by Hamadani.

218. For the reasons I explained above, a person of ordinary skill in the art would be motivated to combine Dvir's system (with or without Koz) with the storage system disclosed in Hamadani.

219. In addition, by February 2001, it was also understood by those skilled in the art that a file is a collection of data that serves as a unit of storage of data, and that data may be stored in one or more files. Indeed, this is a basic notion of computer science and is widely understood by even elementary observers. One dictionary, which reflects how a person of ordinary skill in the art would have understood the term "file" in the context of the '535 patent shows that a file is "[a] collection of information that is treated as a unit." Ex. 1018, pp.268-269 (defining "file"). A person of ordinary skill in the art would have understood that a compressed stream of video data would have been stored as a "file"—i.e., a collection of information that is treated as a unit when it is retrieved from storage.

220. Based on the foregoing, it is my opinion that a person of ordinary skill in the art would have found the subject matter of claim 5 obvious based on their understanding of the combined teachings of Hamadani and Dvir (with or without Koz).

6. *Claim 6 Would Have Been Obvious Over the Combined Teachings of Dvir (With or Without Koz) and Hamadani as Understood By a POSITA*

221. Claim 6 refers back to claim 1. *See* Ex. 1001, cl.6. I have already explained how Dvir (with or without Koz) discloses each aspect of the method of claim 1.

222. Claim 6 further requires “storing at least a portion of the one or more compressed data blocks.” This feature is found verbatim in claim 5 too. Therefore, I incorporate my analysis of claim 5 and conclude, for the reasons given above, that the subject matter of claim 5 would have been obvious to a person of ordinary skill in the art based on the combined teachings of Dvir (with or without Koz) and Hamadani as they would have been understood by a person of ordinary skill in the art.

7. *Claim 12 Would Have Been Obvious Over the Combined Teachings of Dvir (With or Without Koz) and Hamadani as Understood By a POSITA*

223. Claim 12 recites:

[12[P]] The method of claim 1,

[12[A]] wherein the compressing comprises: compressing the at least the portion of the data block with the selected one or more asymmetric compressors to create one or more portions of the one or more compressed data blocks, the at least the portion of the data block having been compressed with the selected one or more asymmetric

compressors to create the one or more portions of the one or more compressed data blocks,

[12[B]] and further comprising: storing at least the one or more portions of the one or more compressed data blocks.

Ex. 1001, cl.12.

224. Based on Dvir (with or without Koz) and Hamadani as they would have been understood by a person of ordinary skill in the art, it is my opinion that claim 12 would have been obvious. I explain the reasons for my opinions in the sections that follow for each aspect of claim 12.

a. [12[P]]: “The method of claim 1,”

225. Claim 12 refers back to claim 1. *See* Ex. 1001, cl.12. I have already explained how Dvir (with or without Koz) discloses each aspect of the method of claim 1.

b. [12[B]]: “wherein the compressing comprises: compressing the at least the portion of the data block with the selected one or more asymmetric compressors to create one or more portions of the one or more compressed data blocks, the at least the portion of the data block having been compressed with the selected one or more asymmetric compressors to create the one or more portions of the one or more compressed data blocks, and further comprising:”

226. Claim 12 requires that “the compressing comprises: compressing the at least the portion of the data block with the selected one or more asymmetric compressors to create one or more portions of the one or more compressed data

blocks, the at least the portion of the data block having been compressed with the selected one or more asymmetric compressors to create the one or more portions of the one or more compressed data blocks.” Ex. 1001, cl.12. A person of ordinary skill in the art would have understood that both Dvir and Hamadani disclose this requirement of claim 12.

227. As I explained in connection with my analysis of limitation [1[C][i]], above, Dvir (with or without Koz) discloses compressing at least a portion of a data block with one or more compressors using the selected asymmetric compressor. I further refer to my discussion of the well-understood fact that MPEG was a well-known asymmetric encoding scheme. For this same reason, a person of ordinary skill in the art would have understood Hamadani’s disclosure of MPEG as a disclosure of an asymmetric compressor. *See, e.g.*, Ex. 1013 at 3:60-63 (“A MPEG encoder 38 compresses the supplied multimedia data in accordance with the well known MPEG compression algorithm.”). And, as I explained in connection with claim 2, this compression in Dvir results in the creation of one or more portions of compressed data blocks. Hamadani also discloses the creation of one or more portions of compressed data blocks. Ex. 1013 at 6:64-67 (“The interface 142 supplies a buffer address generator 144 with the data type and data size information to calculate addresses for reading required compressed data blocks from the texture buffer 70.”).

228. Based on the foregoing, and my reading of Dvir and Hamadani as a whole from the perspective of a person of ordinary skill in the art, Dvir (with or without Koz) and Hamadani disclose “compressing the at least the portion of the data block with . . . one or more asymmetric compressors to create one or more portions of the one or more compressed data blocks, the at least the portion of the data block having been compressed with the selected one or more asymmetric compressors to create the one or more portions of the one or more compressed data blocks,” as required by claim 12 of the ’535 patent. Ex. 1001, cl.12. Additionally, Dvir (with or without Koz) discloses that the asymmetric data compressor is the one selected by analyzing at least one parameter or attribute of the data as I have explained above.

- c. [12[C]]: “storing at least the one or more portions of the one or more compressed data blocks.”

229. Claim 12 also requires “storing at least the one or more portions of the one or more compressed data blocks.” Ex. 1001, cl.12. Hamadani as read from the perspective of a person of ordinary skill in the art discloses this limitation. As I have explained above in connection with my analysis of claims 5 and 6, Hamadani discloses storing at least the one or more compressed data blocks. And, for the reasons I have explained in connection with my discussion of those claims, it would have been obvious to use the teachings of Dvir (with or without Koz) and Hamadani

to perform the claimed method including a step of storing at least the one or more portions of the one or more compressed data blocks.

8. *Claim 15 Would Have Been Obvious Over the Combined Teachings of Dvir (With or Without Koz) and Hamadani as Understood By a POSITA*

230. Claim 15 recites:

[15[P]] A method, comprising:

[15[A]] determining a parameter of at least a portion of a data block;

[15[B]] selecting one or more asymmetric compressors from among a plurality of compressors based upon the determined parameter or attribute;

[15[C]] compressing the at least the portion of the data block with the selected one or more asymmetric compressors to provide one or more compressed data blocks; and

[15[D]] storing at least a portion of the one or more compressed data blocks.

Ex. 1001, cl.15.

231. Considering the Dvir (with or without Koz) and Hamadani references as they would have been understood by a person of ordinary skill in the art, it is my opinion that claim 15 would have been obvious. I explain the reasons for my opinions in the sections that follow for each aspect of claim 15.

a. [15[P]] “A method, comprising:”

232. I have not been asked to render an opinion as to whether the preamble—i.e., the language “[a] method comprising” limits claim 15. For the purposes of my analysis I have assumed that the preamble of claim 15 is limiting. The preamble requires “[a] method comprising” Ex. 1001, cl.15. A person of ordinary skill in the art would have understood that both Dvir and Hamadani disclose methods. I have already explained in connection with my analysis of element [1P], above how Dvir (with or without Koz) discloses a method.

233. Hamadani also discloses a method including, e.g., methods of data compression and decompression. *See, e.g.*, Ex. 1013, 3:6-20 (“In accordance with a method of the present invention, the following steps are carried out: inputting image, graphics and text data to be compressed, compressing by an encoder the image, graphics and text data in accordance with an MPEG compression algorithm, controlling the encoder so as to write into a buffer the compressed image, graphics and text data arranged in blocks of variable sizes, reading by a decoder the compressed image, graphics and text data from the buffer, controlling the decoder so as to read from the buffer the blocks of variable sizes, and decompressing the read image, graphics and text data in accordance with an MPEG decompression algorithm.”).

- b. [15[A]]: “determining a parameter of at least a portion of a data block;”

234. Claim 15 requires a “determining a parameter of at least a portion of a data block.” Ex. 1001, cl.15. I have already explained in connection with my discussion of limitation [1A] how a person of ordinary skill in the art would have understood that Dvir (with or without Koz) discloses this limitation.

- c. [15[B]]: “selecting one or more asymmetric compressors from among a plurality of compressors based upon the determined parameter or attribute;”

235. Claim 15 requires a “selecting one or more asymmetric compressors from among a plurality of compressors based upon the determined parameter or attribute.” Ex. 1001, cl.15. A person of ordinary skill in the art would have understood that Dvir (with or without Koz) discloses this limitation.

236. As I have explained earlier in this declaration, Dvir (with or without Koz) discloses adjusting a compression method “according to the type of software application which generated the video data, and according to the characteristics of data” to be compressed in a “system and method for rapid video data compression and transmission for a wireless remote monitor.” See Ex. 1007 at Abst.

237. Dvir’s method includes “detect[ing] the characteristics of the multimedia data to determine the character of the data, and then” selecting “the multimedia data compression profile, including the compression method according to the character of the data.” Ex. 1007, 2:57-63; *see also id.*, 2:64-3:8, 3:11-21, 4:29-

34 (“[T]he type of multimedia data compression is selected by a profile manager, which detects the characteristics of the multimedia data to determine the profile of the data, and then which selects the multimedia data compression method according to the profile.”), 4:66-5:3 (“[C]ompression profile manager 7 can select the particular type of video compression method for compressing the display data.”), 6:42-45. The selection of the compressor is based on the determined parameters. *See, e.g.*, 4:29-34, 5:27-51, Fig. 1b. As I have explained in detail above, those skilled in the art would have understood that MPEG compression techniques are “notoriously asymmetric,” as reflected in a number of reference materials, including Koz, that would have been considered by a POSITA. Ex. 1010, p.7; *see also* Ex. 1008, p.1; Ex. 1009, p.4; Ex. 1011, p.1; Ex. 1012, p.1; Ex. 1022, 2:8-10.

238. Based on the foregoing, and my reading of Dvir as a whole from the perspective of a person of ordinary skill in the art, Dvir (with or without Koz) discloses a method including “selecting one or more asymmetric compressors from among a plurality of compressors based upon the determined parameter or attribute,” as required by claim 15 of the ’535 patent. Ex. 1001, cl.15.

- d. [15[C]]: “compressing the at least the portion of the data block with the selected one or more asymmetric compressors to provide one or more compressed data blocks; and”

239. Claim 15 requires a “compressing the at least the portion of the data block with the selected one or more asymmetric compressors to provide one or more

compressed data blocks.” Ex. 1001, cl.15. A person of ordinary skill in the art would have understood that Dvir (with or without Koz) discloses this limitation.

240. Specifically, Dvir says that “the compression profile is set to determine the particular video compression method for compressing the video data. The data is then compressed and transmitted.” Ex. 1007, 6:42-45; *see also id.*, 3:6-8. This discloses “compressing” with the “selected” asymmetric compressor (i.e., a compressor operating according to the MPEG standards to provide one or more compressed data blocks. As I explained above in connection with my analysis of claim 1, limitation [1A], a frame or pair of frames would have been understood to be a data block. And, as I explained above, Dvir’s disclosure of an analysis of “groups of rasters” would have been understood to be a portion of a data block. *See* Ex. 1007, 5:31-34. These frames, including the groups of rasters are compressed by Dvir’s MPEG compression scheme selected based upon the analysis of the video data. Ex. 1007, 6:42-45.

241. Based on the foregoing, and my reading of Dvir as a whole from the perspective of a person of ordinary skill in the art, Dvir (with or without Koz) discloses a method including a step of “compressing the at least the portion of the data block with the selected one or more asymmetric compressors to provide one or more compressed data blocks” as required by claim 15 of the ’535 patent. Ex. 1001, cl.15. .

- e. [15[D]]: “storing at least a portion of the one or more compressed data blocks.”

242. Claim 15 requires a “storing at least a portion of the one or more compressed data blocks.” Ex. 1001, cl.15. A person of ordinary skill in the art would have understood that Hamadani discloses this limitation for the reasons I discussed above with respect to my analysis of claims 5 and 6 of the ’535 patent.

243. For the reasons I explained above in connection with my analysis of claims 5 and 6, a person of ordinary skill in the art would have found it obvious to use the techniques for selecting an appropriate MPEG encoding algorithm for a particular type of multimedia data as disclosed by Dvir with the step of storing the compressed data stream. A person of ordinary skill in the art certainly would not have seen anything inventive about storing instead of transmitting the MPEG encoded data stream as it was one of two well understood and known uses of an MPEG encoded stream and was one of the purposes for which MPEG compression was designed.

9. *Claim 16 Would Have Been Obvious Over the Combined Teachings of Dvir (With or Without Koz) and Hamadani as Understood By a POSITA*

244. Claim 16 recites:

The method of claim 15,

wherein the compressing comprises: compressing the at least the portion of the data block with the selected one or

more asymmetric compressors to create one or more portions of the one or more compressed data blocks, the at least the portion of the data block having been compressed with the one or more selected asymmetric compressors to create the one or more portions of the one or more compressed data blocks, and wherein the storing comprises: storing at least the one or more portions of the one or more compressed data blocks.

Ex. 1001, cl.16 (emphasis added). The only difference between claim 16 and claim 12 is the phrase “the selected one or more asymmetric compressors” is changed to read “the one or more selected asymmetric compressors.” Compare Ex. 1001 at cl.12 *with id.* at cl.16. This difference would not have been understood by a person of ordinary skill in the art to be a substantive difference between claim 12 and claim 16. Therefore, I refer back to my analysis of claim 12 above regarding how a person of ordinary skill in the art would have understood Dvir (with or without Koz) and Hamadani to render obvious the subject matter of claim 12 and incorporate my analysis here. For those reasons, a person of ordinary skill in the art would find claim 16 to be obvious.

10. Claim 17 Would Have Been Obvious Over the Combined Teachings of Dvir (With or Without Koz) and Hamadani as Understood By a POSITA

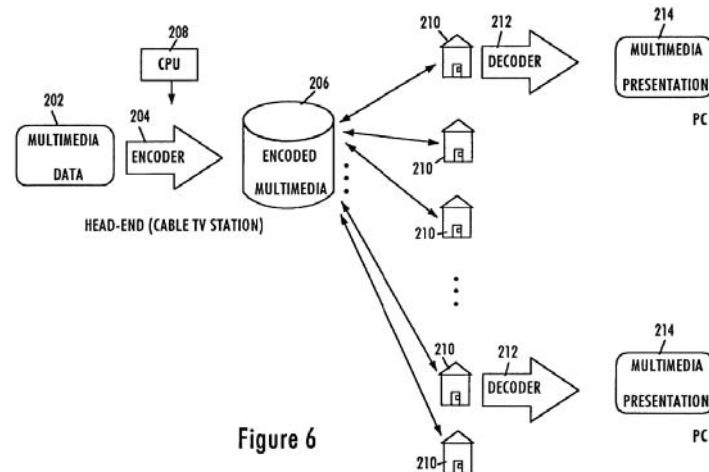
245. Claim 17 refers back to claim 16, which in turn refers back to claim 15.

I have already explained how the combined teachings of Dvir (with or without Koz)

and Hamadani renders the method recited by claims 15 and 16 obvious. Claim 17 further requires a method that includes “retrieving and transmitting at least a portion of the at least stored one or more portions of the one or more compressed data blocks based upon a user command.” Ex. 1001, cl.17. This feature would have been obvious to a person of ordinary skill in the art based on the combined teachings of Dvir (with or without Koz) and Hamadani as I discuss below. Hamadani states that that “compressed multimedia data may be loaded into a data storage 40 or [can be] supplied through a communication channel to a remote location.” Ex. 1013 at 3:62-65. Hamadani further states that “[t]he MPEG encoding and decoding system of the present invention may be used ... for supplying remote users with multimedia data from a central location ...” *Id.* at 4:2-7.

246. Hamadani describes a system in which “[t]he compressed image data are supplied to video service media [], for example, to a TV cable or a telephone system for transmitting to a remote user.” *See* Ex. 1013 at 1:48-50. One example of such a system is shown in Hamadani’s Figure 6. *See id.* at 7:48-51 (“Reference is now made to FIG. 6 of the drawings schematically showing application of the multimedia encoding and decoding system of the present invention to a video on-demand service.”). Hamadani discloses that, in FIG. 6, “[a]t a central location . . . image, graphics and text data from a multimedia data source 202 are compressed by a MPEG encoder 204 in accordance with the MPEG standards [and] stored in an

encoded multimedia storage 206.” *Id.* at 8:51-56. Then, “[w]hen a user at one of the peripheral locations 208 sends a request for the multimedia data stored in the multimedia storage 206, the CPU 208 enables the MPEG decoder 212 associated with the user to read the requested data from the storage 206.” *Id.* at 8:62-66.



Ex. 1013 at Fig. 6.

247. A person of ordinary skill in the art would have understood that, before transmitting stored compressed data, the system must retrieve the stored data. *See* Ex. 1013 at 1:50-56 (“Alternatively, the compressed image data may be loaded into a local video storage for further retrieval by a local or remote user. An MPEG decoder 18 decompresses the compressed image data in accordance with the MPEG decompression algorithm, and supplies them to a video or TV monitor 20 that displays the received image.”). Such a person would have also understood that the retrieval and transmission of data in Hamadani may be in response to a user command. *See id.* at 8:62-66 (“When a user at one of the peripheral locations 208

sends a request for the multimedia data stored in the multimedia storage 206, the CPU 208 enables the MPEG decoder 212 associated with the user to read the requested data from the storage 206.”). Because Hamadani’s multimedia video distribution system is implemented on a computer, the user will issue a command in order to initiate retrieval and transmission of stored compressed data. The person of ordinary skill in the art would have further understood that the user request would cause retrieval of the compressed video data from storage (206) and, then, the transmission of that compressed data to the peripheral location. Thus, Hamadani discloses this aspect of claim 17.

248. When presented with the combined teachings of Dvir (with or without Koz) and Hamadani, a person of ordinary skill in the art would have found the subject matter recited in claim 17 obvious. As I have explained above, a person of ordinary skill in the art would have found Dvir’s techniques for selecting an appropriate MPEG compression method based on the type of multimedia data to be compressed and transmitted. One such context would have been in connection with multimedia distribution systems and methods, such as those disclosed by Hamadani. Such systems allowed users to request multimedia video data and to retrieve compressed video data on-demand, decompress the data, and view the video information on a display. *See* Ex. 1013, 7:48-8:2. This was a common technique

for distributing compressed data content to remote users and was a common use for MPEG compression; it was readily understood by those of ordinary skill in the art.

249. A person of ordinary skill in the art, therefore, would have been led to the claimed subject matter based on the combined teachings of Hamadani and Dvir (with or without Koz). Dvir's scheme for selecting an asymmetric MPEG encoding scheme based on parameters determined from data and compressing using the selected MPEG compression method was useful in compressing different types of multimedia data. *See, e.g.*, Ex. 1007, 2:11-20, 2:27-30. This would have had readily-apparent advantages when used in a multimedia distribution system like that disclosed in Hamadani, where multimedia video data is compressed using an MPEG compression technique, stored, and then retrieved and transmitted based on a user command. A person of ordinary skill in the art would have understood that MPEG encoding was "generic, meaning that" the MPEG compression schemes "are capable of being used by a wide range of applications," Ex. 1019, p.107, and thus would have found it obvious to use Dvir's MPEG encoding method selection techniques in contexts in which data was stored before being retrieved and transmitted to remote locations. A person of ordinary skill in the art would also have understood that the claimed subject matter was simply the combination of known processes used for their intended purposes, and would not have seen any unexpected results from combining the various steps. The usefulness of MPEG compression of multimedia

data, storage, retrieval, and transmission of such data is explicitly taught by Hamadani, Ex. 1013, 7:48-8:2, and would have been an apparent reason for a person of ordinary skill in the art to practice the steps recited in claim 17.

250. Based on the foregoing it would have been obvious to arrive at the subject matter of claim 17, including a method having steps of “retrieving and transmitting at least a portion of the at least stored one or more portions of the one or more compressed data blocks based upon a user command” as required by claim 17 based on the combined teachings of Dvir (with or without Koz) and Hamadani. Ex. 1001, cl.17.

11. Claim 19 Would Have Been Obvious Over the Combined Teachings of Dvir (With or Without Koz) and Hamadani as Understood By a POSITA

251. Claim refers back to claim 16, which itself refers back to claim 15. I have already explained how the combined teachings of Dvir (with or without Koz) and Hamadani would have rendered the subject matter of claims 15 and 16 obvious to a person of ordinary skill in the art. Claim 19 further requires a method including steps of “retrieving and transmitting at least a portion of the at least stored one or more portions of the one or more compressed data blocks based on a user value.” Ex. 1001, cl.19. This claim differs from claim 17 in only one way—instead of requiring the retrieval and transmission be based on a “user command” it is based on a “user value.” *Compare* Ex. 1001, cl.17 *with id.* cl.19. In my opinion a person

of ordinary skill in the art would have found the performance of these steps obvious based on the combined teachings of Dvir (with or without Koz) and Hamadani for the reasons that follow.

252. Hamadani explains that “a user at one of the peripheral remote locations 208 sends a request for the multimedia data stored in the multimedia storage 206.” Ex. 1013, 7:62-66. Hamadani’s “user request” is sent over a network consisting of “cables or telephone lines.” *Id.*, 7:58-62. A person of ordinary skill in the art would have recognized from the teachings of Hamadani, which relates to a digital system that links person computers with MPEG decoders with a video on demand system, that user requests can be represented as digital data—signals that represent voltage high and voltage low conditions that can be interpreted by a computer as information requesting that the computer take a specific action. Therefore, a person of ordinary skill in the art that would have understood that Hamadani’s request operates based on digital data which represents the values of user input requesting specific multimedia video data.

253. For the reasons that I have given in connection with my discussion of claims 16 and 17 a person of ordinary skill in the art considering the teachings of Dvir (with or without Koz) and Hamadani would have found a method including a step of “retrieving and transmitting at least a portion of the at least stored one or

more portions of the one or more compressed data blocks based on a user value,” as recited in claim 19 of the ’535 patent obvious.

12. Claim 22 Would Have Been Obvious Over the Combined Teachings of Dvir (With or Without Koz) and Hamadani as Understood By a POSITA

254. Claim 22 refers back to claim 16 which itself refers back to claim 15. I have already explained how the combined teachings of Dvir (with or without Koz) and Hamadani would have rendered the subject matter of claims 15 and 16 obvious to a person of ordinary skill in the art. Claim 22 further requires that “the at least stored one or more portions of the one or more compressed data blocks comprises: audio or view data.” Ex. 1001, cl.22. A person of ordinary skill in the art would have found the subject matter of claim 22 obvious over the combined teachings of Dvir (with or without Koz) and Hamadani.

255. Both Dvir and Hamadani discuss processing video data. *See, e.g.* Ex. 1007 at Abst. (“A system and method for rapid video data compression and transmission for a wireless remote monitor.”); Ex. 1013 at 3:46-47 (“FIG. 6 is a schematic diagram illustrating implementation of the present invention in a video-on-demand system.”). It would have been routine to implement the teachings of Dvir and Hamadani in connection with the compression of multimedia video data because that is the express purpose of the systems and methods disclosed in both of those references. Doing so would have required no ingenuity and would have

instead required only a straightforward application of the teaching of those references.

D. Claim 21 Would Have Been Obvious Over the Combined Teachings of Dvir (With or Without Koz), Hamadani, and Figueredo as Understood By a POSITA

1. Assumptions

256. For the purposes of my analysis, I have been informed that Dvir, Koz, Hamadani, and Figueredo are prior art to the '535 patent and I have assumed that information is correct for the purposes of my analysis.

2. Overview of Dvir, Koz, and Hamadani

257. I have already provided an overview of the teachings of Dvir, Koz, and Hamadani above.

3. Overview of Figueredo

258. Figueredo describes “[a] method of and apparatus for transmitting video images.” Ex. 1020 at Abst. Figueredo discusses its techniques and systems in the context of medical diagnostic applications and in order to “allow[] a specially trained individual to remotely supervise, instruct, and observe administration of medical tests conducted at remote locations.” *Id.* However, a person of ordinary skill in the art reading Figueredo would have understood that Figueredo also had “benefits in non-medical applications” as the reference itself teaches. *See id.* at 7:45-47. Indeed, the proposed system has applications in any scenario relating to transmission of compressed video data.

259. Figueredo's "FIG. 1 illustrates a video system for transmitting video images from one location to another." Ex. 1020 at 3:21-24. FIG. 2 in essence depicts the flow of data in the video system of FIG. 1. *See id.* at 4:44-47 ("FIG. 2 illustrates a data path diagram of the preferred embodiment of the present invention. FIG. 2 shows a video system 200 which is similar to the video system 100 shown in FIG. 1."). FIGs. 1-2 are reproduced below.

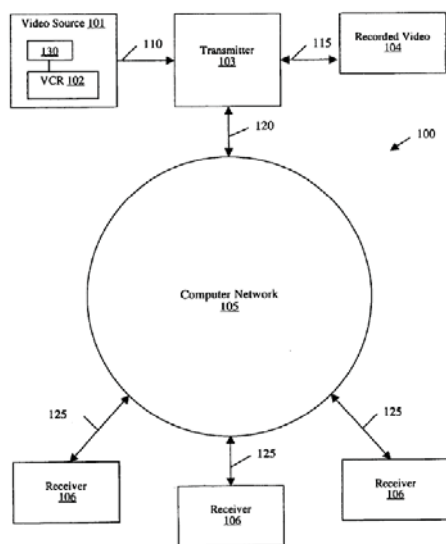


Fig 1

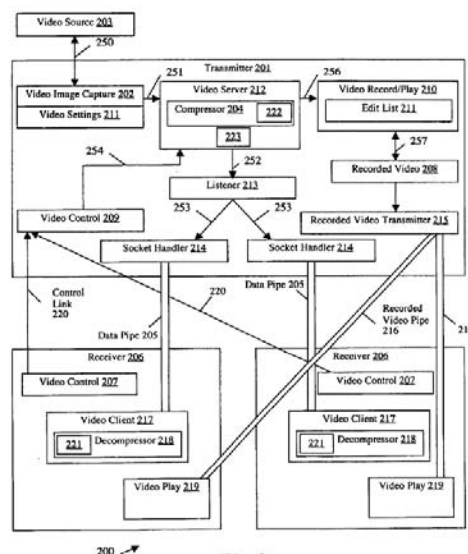


Fig 2

Ex. 1020 at Figs. 1-2.

260. The system described in Figueredo includes "a video source 101, a video cassette recorder 102, a transmitter 103, a recorded video device 104, a computer network 105, a plurality of receivers 106, and data links 110, 115, 120, and 125." *Id.* at 3:24-27. "The video source 101 is capable of providing either a real-time video image or a pre-recorded video image." *Id.* at 3:52-54. "The video

source 101 is preferably configured to transfer the video image to the transmitter 103 via the data link 110.” *Id.* at 3:27-29. “The recorded video device 104 is [] coupled to the transmitter 103 via the data link 115 [and] stores video images received by the transmitter 103 for playback at a later time.” *Id.* at 4:6-9. “The transmitter 103 preferably controls the flow of video images from both the video source 101 and the recorded video component 104 over the computer network 105 to any number of the plurality of receivers 106.” *Id.* at 4:15-18. “[T]he computer network 105 is preferably an Internet Protocol network.” *Id.* at 4:24-25.

261. Figueredo discloses that the system is capable of transmitting video images captured by a video source 101 from a transmitter (103, 201) either in real-time or at a later time. *Id.* at 3:52-55. “In order to transmit the compressed stream of video images in real-time, the transmitter preferably transmits the compressed stream of video images through the listener device 213.” *Id.* at 5:31-34. “In order to transmit the stream of video images at a later time, the video recorder 210 preferably stores the stream of video images.” *Id.* at 5:50-52. In both cases, “[a]s the stream of video images are received by the video server 212, [a] compressor 204 is configured to compress the stream of video images thereby creating a compressed stream of video images”, and “[a]s this compressed stream of video images is generated, the compressor 204 transmits each data block into the buffer 223.” *Id.* at 5:9-14.

262. FIGs. 8A and 8B depict transmission of real-time and pre-recorded videos respectively. Both transmission modes require compression of data and transmission of compressed data. However, in FIG. 8B, unlike in FIG. 8A, “the compressed stream of video images is stored within the recorded video device 208 (FIG. 2), thus forming a pre-recorded and compressed stream of video images.” *Id.* at 8:49-52. “This pre-recorded and compressed stream of video images is capable of being stored indefinitely and transmitted to one of the plurality of receivers 206 (FIG. 2) at any time.” *Id.* at 8:52-55. This additional storage step is illustrated in the image to the right, and is highlighted in yellow.

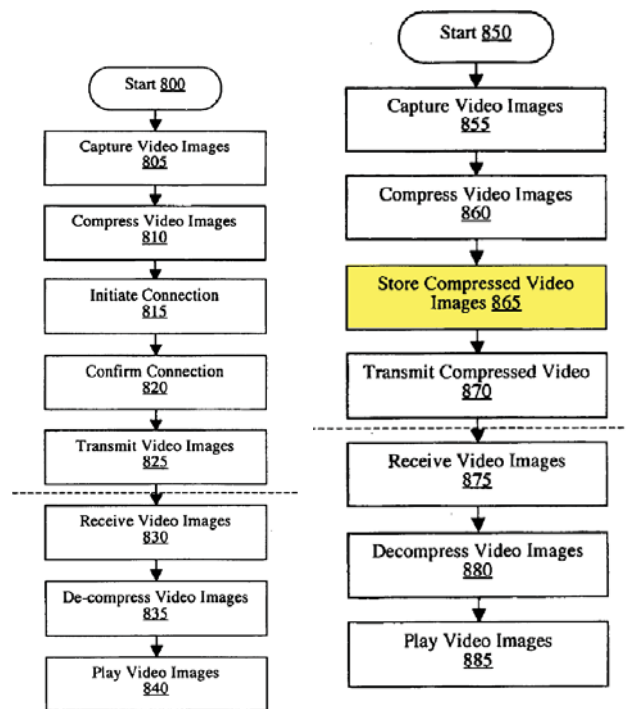


Fig 8A

Fig 8B

Ex. 1020 at FIG. 8A & FIG. 8B (annotated).

263. Figueredo discloses that “[r]emote users utilizing the remote receiving devices [i.e., the receivers 106 & 206] are capable of remotely controlling a number of parameters relating to the source device and the transmitting device.” *Id.* at Abst. “Such parameters include image quality, storage of the video images on the transmitting device, manipulating and controlling the source device, and the like.” *Id.* at Abst. Figueredo further notes that “a user interfacing with one of the plurality of receivers 206 is able to modify the frame size, frame rate, compression algorithm, and other parameters of the incoming stream of video images to one of the plurality of receivers 206.” *Id.*, 6:17-21. The user may specify “a subset of the video frame area to be transmitted in order to increase image and motion quality,” and can “record a specific transmitted segment, [and] transmit that segment at a later time, and view the segment full frame and full motion.” Ex. 1020 at 7:7-19.

264. Figueredo discloses that the remote user may change “parameters of [an] incoming stream of video images” based on network conditions such as a throughput of the system or a communication channel within the system. For example, Figueredo discloses “reporting to the user when any of the requested capture, compression, transmission, decompression, and display parameters cannot be met, such that the requested quality is not being achieved.” Ex. 1020 at 6:59-63. Such a “quality notification includes timestamps (indicating the deadline when the frame of live video must be displayed), dropped frame indicators, performance, and

network information”, and thus “informs the user [] whether or not the current image is actually being displayed at [] quality.” *Id.* at 7:20-26.

265. In response to a notification of poor quality, a remote user such as a physician may decide to “use only the medical quality portions of the transmission in the diagnosis” and/or “change the settings (e.g. compression method, area of image, frame rate, contrast, etc.) until medical quality transmission can be achieved and maintained.” Ex. 1020 at []. Moreover, “[i]f medical quality live transmission cannot be achieved in a given circumstance, e.g. over a 56K bit per second modem connection, the remote physician can still remotely direct the selection of the image (e.g. with a setting of one frame per second) and remotely start and stop the recorder, and then later download the recorded video.” *Id.* at 7:28-33. Figueredo notes that “[t] his notification of the quality of the transmission also has benefits in non-medical applications.” *Id.* at 7:45-47.

4. *Claim 21 Would Have Been Obvious Over the Combined Teachings of Dvir (With or Without Koz), Hamadani, and Figueredo as Understood By a POSITA*

266. Claim 21 refers back to claim 16, which itself refers back to claim 15. . I have already explained how the combined teachings of Dvir (with or without Koz) and Hamadani would have rendered the subject matter of claims 15 and 16 obvious to a person of ordinary skill in the art. Claim 21 further requires the steps of “retrieving and transmitting at least a portion of the at least stored one or more

portions of the one or more compressed data blocks based upon a throughput of a communication channel used for transmission of the at least retrieved portion of the at least stored one or more portions of the one or more compressed data blocks.” Ex. 1001, cl.21. As I explain below, the subject matter of claim 21 would have been obvious over the combined teachings of Dvir (with or without Koz), Hamadani, and Figueredo.

267. While neither Dvir nor Hamadani expressly say that the retrieval and transmission of stored MPEG encoded data is “based upon a throughput of a communication channel used for transmission of the at least retrieved portion of the at least stored one or more portions of the one or more compressed data blocks,” Ex. 1001, cl.21, Figueredo teaches that if a certain video quality cannot be obtained “in a given circumstance, e.g., over a 56K bit per second modem connection, the remote physician can still remotely direct the selection of the image (e.g., with a setting of one frame per second) and remotely start and stop the recorder, and then later download the recorded video.” Ex. 1020, 7:28-38.

268. A person of ordinary skill in the art would have understood Figueredo to disclose stopping and/or delaying retrieval and transmission of video data at a particular time if the throughput of a network for transmitting data falls below a desired level. Therefore, a person of ordinary skill in the art would have understood that Figueredo discloses “retrieving and transmitting at least a portion of the at least

stored one or more portions of the one or more compressed data blocks based upon a throughput of a communication channel used for transmission of the at least retrieved portion of the at least stored one or more compressed data blocks,” as recited in claim 21.

269. A person of ordinary skill in the art would have found it arrive at the subject matter of claim 21 based on the combined teachings of Figueredo, Hamadani, and Dvir (with or without Koz) to arrive at the subject matter of claim 21. As I have explained earlier in this declaration, all three references are directed to compression, transmission, and remote display of video data. Additionally, a person of ordinary skill in the art would have understood that certain advantages offered by the delayed-transmission techniques in Figueredo would have been valuable for use in a video distribution system such as that disclosed in Hamadani, particularly in the time frame leading up to February 2001, when Internet speeds in many locations were not nearly as fast as they are today.

270. By using Figueredo’s techniques of delaying retrieval and transmission of compressed video data based on the throughput of the communications channel, a person of ordinary skill in the art would have seen advantages to remote users of systems that transmit data over limited-bandwidth network or during a time of increased network congestion. In such systems, the techniques disclosed in Figueredo allowed a user to delay use of a low-bandwidth or low-quality, and/or

high congestion connection until a time when network conditions improve or when using the connection would be least disruptive. For example, a user using a telephone line connection and a slower modem to acquire video information can defer downloading the video until a time when the telephone would not be used by the user—e.g., during night time.¹

271. A person of ordinary skill in the art would also have understood that the techniques disclosed in Figueredo were also useful in connection with systems that would otherwise stream video instead of storing it. Indeed, Figueredo discloses such an embodiment. *See* Ex. 1020, Fig. 8a. For example, a person of ordinary skill in the art would have understood that when network conditions deteriorated, Figueredo’s techniques allowed remote users of streaming video systems to opt to download a prerecorded version of the streamed video at a later time instead of obtaining the low-quality stream or viewing it in a manner that would be “choppy”—i.e., missing frames or other data that made viewing awkward, poor quality, or otherwise a bad user experience. A person of ordinary skill in the art would have

¹ Those skilled in the art were familiar with traditional “dial-up” modem connections in which the computer would use the line and the telephone could not be used during the time that the modem was connected to the Internet Service Provider (ISP).

found the step of waiting to retrieve and transmit data based on the channel throughput to be an expected and commonplace step, which had anticipated benefits. Certainly, a person of ordinary skill in the art would not have seen any unexpected results from using the steps of retrieving and transmitting based on channel throughput, and instead would have believed the use of such a technique to be a predictable use of old technology.

272. A person of ordinary skill in the art would have recognized these advantages to retrieving and transmitting compressed video data at a later time based on the throughput of the communications channel. Therefore, given the advantageous and elementary nature of the steps of retrieving and transmitting stored data based on the throughput of the communications channel, the aforementioned teachings in Hamadani and Figueredo, the person of ordinary skill in the art would have found it obvious to rely on the interrelated teachings of Dvir (with or without Koz), Hamadani, and Figueredo to arrive at a method in which data was compressed using certain MPEG profiles depending on the type of multimedia video data, in which the data was stored before being transmitted, and in which the retrieval and transmission of the compressed data was driven by the throughput of the channel. None of these features would have been understood to have any unexpected effect when used in conjunction with a video distribution system, and instead they would have been seen as performing their routine purposes in such systems. Therefore, it

is my opinion that the subject matter recited by claim 21 would have been obvious based on the combined teachings of Dvir (with or without Koz), Hamadani, and Figueredo.

E. Claims 1, 8, 15, and 24 Would Have Been Obvious Over The Combined Teachings Of Ishii And Koz As Understood By A POSITA

1. Assumptions

273. For the purposes of my analysis, I have been informed that Ishii and Koz are prior art to the '535 patent and have I assumed that information is correct for the purposes of my analysis.

2. Overview of Ishii

274. Ishii describes a “file compression processor” that is used to store data including image and text data to a storage medium. *See* Ex. 1021, 1:11-15. An object of Ishii “is to provide a file compression processor which enables effective file utilization and prevents file compression when there is sufficient available capacity in the file unit and selects the suitable compression method corresponding to the access frequency and the type of the file.” *Id.* at 1:50-55.

275. Ishii explains that there were certain problems with “on-line information services” that maintain “an extremely large volume of data and utilize various compression techniques for recording data to the storage media.” *See id.* at 1:17-28. Ishii identifies two primary inefficiencies in those systems: (i) “files are compressed even when the file unit has sufficient available capacity” and thus

compression may not be necessary; and (ii) “the data compression method [used in those systems] is limited to one[,] even when the applicable file does not require the same compression/decompression speed and compression ratio, depending on the access frequency and the file type ...” *See id.* at 1:32-25, 39-44.

276. FIG. 1 of Ishii “is a block diagram of a file compression processor,” while FIG. 2 is a “flowchart to show the operation of file compression processing of the file compression processor.” Ex. 1021 at 3:52-57

277. “The file compression processor 100 comprises, as shown in [FIG .1], a file status monitor portion 101, a file search portion 102, a file compression method selection portion 104, a file compression portion 105 and a file decompression portion 106.” Ex. 1021 at 5:33-37. “The file status monitor portion 101 judges whether the current available file capacity on the file unit 130 controlled by the file attribute controller 132 is over or below the predetermined threshold value.” *Id.* at 5:38-41. “When the file status monitor portion 101 judges that the current available file capacity is below the threshold, the file search portion 102 searches the files to be compressed for a file not yet compressed with a lower access frequency.” *Id.* at 5:43-48. Then, for the files selected to be compressed, “[t]he file compression method selection portion 104 selects the method used by the data compression portion 105 to compress data of the file to be compressed.” *See id.* at 5:66-6:1.

278. Ishii discloses that the selection portion 104 selects suitable compression algorithms for data based on “data attribute[s] and (whether it is text data or binary data such as programs and image data) and access frequency” of data. *See id.* at 6:1-4. For example, “[t]he data compression methods selection portion 104 selects, from some data compression methods selected according to the data attribute, the one with shorter data compression/decompression time for a file with higher access frequency and the one with a higher compression ratio for a file with lower access frequency.” *Id.* at 6:12-17. “The access frequency of a file is determined based on the last access date and the number of accesses for that file and is given as high, medium and low.” *Id.* at 5:54-56.

279. Ishii also discloses “a file search means which searches for already compressed files with high access frequency, based on the control information of the file attribute controller, so as to select compressed files for decompression by the decompression means.” Ex. 1021 at 3:29-34. A person of ordinary skill in the art would have understood this to disclose decompressing files with high access frequency.

3. *Overview of Koz*

280. I have already provided an overview of the teachings of Koz above.

4. *Motivation to Combine Ishii and Koz*

281. Both Ishii and Koz describe systems for compressing data. *See, e.g.*, Ex. 1021, 1:11-15 (describing compression of text and image data); Ex. 1022, 1:66-9:25 (describing compression of video data with MPEG encoding).

282. Based on the foregoing teachings of the prior art as they would have been understood by a person of ordinary skill in the art, it would have been obvious to implement Ishii's techniques—which a person of ordinary skill in the art would have understood to be applicable to file storage systems with many different types of files—with files that include video data in addition to Ishii's expressly disclosed “text” and “image” files. Additionally, it would also have been obvious when implementing Ishii's teachings to use compression algorithms that were known and available for compressing and decompressing video data—such as the MPEG compression technique. The use of the MPEG compression algorithm would have led video files to be compressed with an asymmetric compression algorithm, which commonly resulted from the use of interframe coding. Ex. 1022 at 2:9-11. Indeed, a person of ordinary skill in the art reading Ishii would have understood that Ishii is capable of being implemented in connection with file storage systems that accommodated a variety of files other than just image files and text files. This is because Ishii looks at file attributes to determine the file type. A person of ordinary skill in the art would have seen that it would be easy to identify other known file

types and include compression algorithms for those file types in some system designed according to Ishii's principles. *See* Ex. 1021 at 6:7-9.

283. Given (1) the increase in use of video data in both storage and transmission systems, (2) the knowledge that video compression techniques were effective at achieving substantial reduction in file size for video data, *see, e.g.*, Ex. 1022 at 1:33-36 ("In the field of digital video transmission or digital video storage and retrieval, great attention has been directed to data compression and compaction to reduce costs and improve performance under bit budget constraints."), a person of ordinary skill in the art would have found it obvious to use Ishii's techniques for identifying files for compression in circumstances in which the data storage system also includes video files based on the access frequency of those files. The person of ordinary skill in the art would have recognized that the benefits that would accrue in a system that involved the compression of, for example, text and image files would also accrue in connection with the compression of video files, which tended to be larger files and would therefore have likely freed up more storage space when compressed.

5. *Claim 1 Would Have Been Obvious Over the Combined Teachings of Ishii and Koz as Understood by a POSITA*

284. After considering the Ishii and Koz references as they would have been understood by a person of ordinary skill in the art, it is my opinion that claim 1 would

have been obvious. I explain the reasons for my opinions in the sections that follow for each aspect of claim 1.

a. [1[P]]: “A method comprising:”

285. I have not been asked to render an opinion as to whether the preamble limits claim 1. For the purposes of my analysis, however, I have assumed that the preamble of claim 1 is limiting. The preamble of claim 1 states “[a] method comprising” Ex. 1001, cl.1.

286. A person of ordinary skill in the art would have read Ishii as disclosing a method for compressing data based in part on data parameters. *See, e.g.*, 1021 at 2:17-29 (“According to the still preferred construction, a file compression processor further comprises a file attribute controller which stores the control information for the files recorded on the file unit. The control information includes the last access date, the number of accesses, whether the file is already compressed or not and the data type. Also provided is a compression method selection means which determines the data type and the access frequency of the file compressed by the compression means based on the control information of the file attribute controller, selects the file compression method suitable for the data type and the access frequency and instructs the compression means to execute processing by the selected compression method.”); 2:30-47 (“According to another preferred construction, a file compression processor further comprises a file attribute controller which stores the

control information for the files recorded on the file. The control information includes the last access date, the number of accesses, whether the file is already compressed or not and the data type. Also included is a file search means which searches for files not yet compressed with a low access frequency based on the control information of the file attribute controller, so as to select files to be compressed for compression by the compression means. Further, there is a compression method selection means which determines the data type and the access frequency of the file to be compressed selected by the file search means based on the control information of the file attribute controller, selects the file compression method suitable for the data type and the access frequency and instructs the compression means to execute processing by the selected compression method.”). Therefore, Ishii discloses “[a] method.” Ex. 1001, cl.1.

- b. [1[A]]: “determining a parameter or attribute of at least a portion of a data block having audio or video data;”

287. Claim 1 requires “determining a parameter or attribute of at least a portion of a data block having audio or video data.” Ex. 1001, cl.1. A person of ordinary skill in the art would have found this aspect of claim 1 obvious (and indeed, the claimed subject matter as a whole, as I explain below) obvious based on the combined teachings of Ishii and Koz.

288. Ishii discloses selecting parameters or attributes of data. For example, Ishii explains that for a specific data block—e.g., a file—an “access frequency” is

determined. Ex. 1021 at 5:51-59. “The access frequency of a file is determined based on the last access date and the number of accesses for that file” Ex. 1021 at 5:54-55.

289. A person of ordinary skill in the art would have understood Ishii’s access frequency depends on two things: (1) the recency of access and (2) the frequency of access of data. *See id.* at 5:51-57 (“The file attribute controller 132 has as file control information, including a list of file names and directories, as well as the last access date and the number of accesses for each file. The access frequency of a file is determined based on the last access date and the number of accesses for that file and is given as high, medium and low.”). Such a person would also have understood that both of the values that make up the “access frequency” are parameters and/or attributes of data.

290. While Ishii does not explicitly discuss video compression or compressing video data, a person of ordinary skill in the art would have understood that the techniques discussed in Ishii apply to files that include video data. For example, a person of ordinary skill in the art reading Ishii would have understood that video files would have access frequencies and would have recognized that a file system using the techniques disclosed by Ishii for compressing files that are not in high demand when a storage threshold is exceeded would have had benefits

regardless of the type of data in the files being examined, compressed, and decompressed.

291. A person of ordinary skill in the art reading the collective teachings of Ishii and Koz would have seen that both Ishii and Koz disclose compressing and decompressing image data. *See* Ex. 1021 at 7:53-55 (“Data compression methods for binary files (image data) include the run-length coding and the differential mapping method.”); Ex. 1022 at 2:2-3 (referring to “JPEG still image compression standard”). A person of ordinary skill in the art would have further understood that video data was another type of data that could be present on a data storage system and which would benefit from compression. *See, e.g.*, Ex. 1013 at 1:46-52 (discussing transmission and storage of MPEG-compressed multimedia data); Ex. 1022 at 1:20-21 (“Transmission and/or storage of digital data are employed in nearly all data processing and transmission applications.”); *id.* at 1:55-56 (“Digital data compression plays an important role in video storage and transmission.”). I explain in further detail below why a person of ordinary skill in the art would have found the subject matter of claim 1 obvious over the combined teachings of Ishii and Koz.

- c. [1[B]]: “selecting an access profile from among a plurality of access profiles based upon the determined parameter or attribute;”

292. Claim 1 requires “selecting an access profile from among a plurality of access profiles based upon the determined parameter or attribute.” Ex. 1001, cl.1.

A person of ordinary skill in the art would have understood that Ishii discloses this aspect of claim 1.

293. As I have explained above, Ishii determines an “access frequency” by looking at two parameters or attributes of the data: (1) the last access data and (2) the number of times the file has been accessed. *See* Ex. 1021 at 5:54-56. Based on this information, Ishii classifies the access frequency of the file as “high, medium, [or] low.” *Id.* A person of ordinary skill in the art would have understood from these teachings that each file in Ishii’s storage system is classified as “low access,” “medium access,” and “high access.” Ishii then uses these classifications to determine which files to compress. As such, Ishii has selected an “access profile”—i.e., high, medium, or low access—based on the parameters or attributes including the access frequency. These classifications of the files are access profiles because they reflect one or more characteristics of the data, such as the data’s last access data and frequency of access and the data is used in data compression because it is used to determine which files to compress. *See* Ex. 1021 at 7:49-62 (“The file compression method selection portion 104 selects Lempel-Ziv coding for files with high access frequency and Huffman or arithmetic coding for files with low access frequency.”). Therefore, a person of ordinary skill in the art would have understood that Ishii’s classification of access frequency selects an access profile based upon a determined parameter or attribute of data, i.e., parameters or attributes related to

access frequency of data. Indeed, Ishii’s techniques are similar to those disclosed in an embodiment of the ’535 patent. *Compare* Ex. 1021 at 5:50-59 *with* Ex. 1001 at 11:50 (table).

- d. [1[C][i]]: “compressing the at least the portion of the data block with one or more compressors using asymmetric data compression and information from the selected access profile,”

294. Claim 1 recites “compressing the at least the portion of the data block with one or more compressors using asymmetric data compression and information from the selected access profile.” Ex. 1001, cl.1. The combined teachings of Ishii and Koz disclose the features recited in this limitation and it would have been obvious for a person of ordinary skill in the art to have arrived at the claimed subject matter based on the combined teachings of Ishii and Koz.

295. Ishii discloses “compressing the at least the portion of the data block with one or more compressors using . . . information from the selected access profile” as required by claim 1. Ex. 1001, cl.1. Ishii discloses that “[t]he data compression method selection portion 104 selects, from some data compression methods selected according to the data attribute, the one with shorter data compression/decompression time for a file with higher access frequency and the one with a higher compression ratio for a file with lower access frequency.” Ex. 1021 at 6:12-17.

296. A person of ordinary skill in the art would have understood that Ishii discloses compressing data using compressors selected based on access frequency

classifications for the data (i.e., low, medium, and high) and that such classifications constitute access profiles. Ishii therefore discloses compressing the at least the portion of the data block with one or more compressors using information from the selected access profile—i.e., whether the file has a low access profile and is therefore selected for compression.

297. Ishii does not explicitly disclose that the compressors use asymmetric data compression as required by claim 1. Koz discloses compressing video data with asymmetric compression techniques—namely MPEG compression techniques. Koz explains that “[a]s with most interframe compression schemes, MPEG is asymmetric—compression requires more effort than decompression.” Ex. 1022, 2:9-11. This reflects what those of ordinary skill in the art already knew about video compression techniques—and particular MPEG techniques—they were “notoriously asymmetric.” Ex. 1010, p.7; *see also* Ex. 1008 at p.1 (“MPEG uses an asymmetric coding model where encoding requires substantially more computational power than decoding.”); Ex. 1009 at p.4 (“the MPEG algorithm is notoriously asymmetric”); Ex. 1011 at p.1 (“MPEG is a asymmetric codec.”); Ex. 1012 at p.1 (“MPEG is asymmetric”). As I explain below, it would have been obvious to use Ishii’s techniques in a system that included the ability to store files including video data and to use compression techniques that were intended to be

used to compress video data, such as MPEG techniques, which were known to be asymmetric techniques.

- e. [1[C][ii]]: “the information being indicative of one or more compressors to apply to the at least the portion of the data block.”

298. Claim 1 requires “the information being indicative of one or more compressors to apply to at least the portion of the data block.” Ex. 1001, cl.1. A person of ordinary skill in the art would have understood Ishii discloses this limitation.

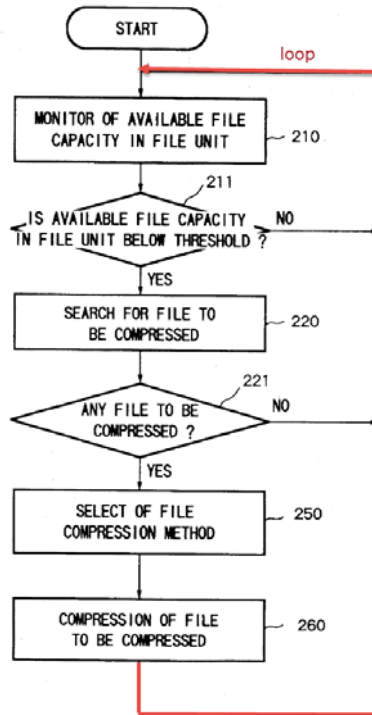
299. For example, Ishii discloses “[t]he data compression method selection portion 104 selects, from some data compression methods selected according to the data attribute, the one with shorter data compression/decompression time for a file with higher access frequency and the one with a higher compression ratio for a file with lower access frequency.” Ex. 1021 at 6:12-17. In doing so, Ishii discloses that information from access frequency classifications (i.e., access profiles) indicate one whether to apply a compressor with a shorter or longer compression time depending on the access profile as would have been appreciated by a person of ordinary skill in the art.

6. *Claim 8 Would Have Been Obvious Over the Combined Teachings of Ishii and Koz as Understood By a POSITA*

300. Claim 8 refers back to claim 1. See Ex. 1001, cl.8. I have already explained how the combined teachings of Ishii and Koz would have rendered the

subject matter of claim 1 obvious to a person of ordinary skill in the art. Claim 8 further requires a step of “selecting the one or more compressors to compress the at least the portion of the data block to create the at least a second compressed data block based upon a number of reads of at least a portion of the first compressed data block that was created from the at least the portion of the data block.” Ex. 1001, cl.8. The claimed subject matter would have been obvious to a person of ordinary skill in the art based on the combined teachings of Ishii and Koz.

301. A person of ordinary skill in the art would have understood that the process noted in FIG. 2 of Ishii is a repetitive process, meaning that after it is executed, it loops back and executes again. *See* Ex. 1021 at 7:67-8:8-2 (“Upon completion of file compression processing, the system returns to Step 210 to repeat the procedure. The file compression processing is repeated until the available file capacity becomes higher than the threshold value.”). Therefore, such a person would understand that if access frequency and compression status of a file change, the file may be recompressed during a next iteration of the process.



302. Ex. 1021, Fig. 2 (annotated). A person of ordinary skill in the art would have understood that Ishii discloses compressing a first data block, as I have explained in connection with my discussion of claim 1, above. Once that data block—e.g., the “file”—has been compressed, in order to access that file, the file will need to be decompressed as taught by Ishii. *See* Ex. 1021 at 8:16-22 (“If the file is not compressed, then the file is read out as it is. If it is compressed, then the data compression method is obtained from the file attribute information (Step 320) and the file is decompressed by the method corresponding to that compression method (Step 311)”). Based on Ishii’s teachings, because the file was accessed, the last access data and the number of accesses would be updated. *See, e.g.,* Ex. 1021 at 5:51-59. At some later point in time, the system can determine that the file unit

capacity is below a threshold. *Id.*, Fig. 2, 5:43-50, 6:63-7:5. And, when this happens, the same video file may be selected again for compression based on the “number of reads of at least a portion of the first compressed data block,” as required by claim 8 of the ’535 patent. Ex. 1001, cl.8; Ex. 1021, 5:60-6:17, 7:15-8:10.

7. *Claim 15 Would Have Been Obvious Over the Combined Teachings of Ishii and Koz as Understood By a POSITA*

303. After considering the Ishii and Koz references as they would have been understood be a person of ordinary skill in the art, it is my opinion that claim 15 would have been obvious. I explain the reasons for my opinions in the sections that follow for each aspect of claim 15.

a. [15[P]]: “A method, comprising:”

304. I have not been asked to render an opinion as to whether the preamble—i.e., the language “[a] method comprising” limits claim 15. For the purposes of my analysis I have assumed that the preamble of claim 15 is limiting. The preamble requires “[a] method comprising” Ex. 1001, cl.15. A person of ordinary skill in the art would have understood that Ishii discloses a method as I have explained in connection with my analysis of element [1P], above.

b. [15[A]] “determining a parameter of at least a portion of a data block;”

305. Claim 15 requires “determining a parameter of at least a portion of a data block.” Ex. 1001, cl.15. I have already explained in connection with my discussion of limitation [1A] and the combined teachings of Ishii and Koz how a

person of ordinary skill in the art would have understood that Ishii discloses this limitation.

- c. [15[B]]: “selecting one or more asymmetric compressors from among a plurality of compressors based upon the determined parameter or attribute;”

306. Claim 15 requires “selecting one or more asymmetric compressors from among a plurality of compressors based upon the determined parameter or attribute.” Ex. 1001, cl.15. A person of ordinary skill in the art would have understood that Ishii discloses selecting one or more compressors “from among a plurality of compressors based upon the determined parameter or attribute” as required by claim 15 of the ’535 patent. Ex. 1001, cl.15.

307. Ishii explains

The file compression method selection portion 104 selects the method used by the data compression portion 105 to compress data of the file to be compressed. It selects the data compression method suitable for the file considering the data attribute (whether it is text data or binary data such as programs and image data) and access frequency, included among the control information concerning the file in the file attribute controller 132.

The data attribute of a file is checked in the selection of the data compression method so as to select a suitable data compression method with a higher compression ratio. The access frequency of a file is used for selecting a data

compression method with shorter data compression/decompression time. The data compression methods selection portion 104 selects, from some data compression methods selected according to the data attribute, the one with shorter compression/decompression time for a file with higher access frequency and the one with a higher compression ratio for a file with lower access frequency.

Ex. 1021, 5:66-6:17. In this way, Ishii is teaching the selection of one or more compressors based on the parameter or attribute of the data.

308. As explained in connection with my analysis of claim 1, limitation [1[C][i]], I explained why a person of ordinary skill in the art would have found it obvious to use asymmetric data compression—and specifically MPEG data compression—to compress video data in accordance with the teachings of Ishii and Koz taken together. I incorporate that analysis into my analysis of this aspect of claim 15.

- d. [15[C]]: “compressing the at least the portion of the data block with the selected one or more asymmetric compressors to provide one or more compressed data blocks; and”

309. Claim 15 requires “compressing the at least the portion of the data block with the selected one or more asymmetric compressors to provide one or more compressed data blocks.” Ex. 1001, cl.15. As I have already explained above in connection with limitation [15[B]], it would have been obvious to perform a step of

selecting an asymmetric compressor for compressing video data in a system designed using the techniques disclosed in Ishii. Specifically, as I explained above, it would have been obvious to select an MPEG encoder. And, for those same reasons, it would have been obvious to compress the “at least the portion of the data block with the selected one or more asymmetric compressors to provide one or more compressed data blocks.” Ex. 1001, cl.15.

- e. [15[D]]: “storing at least a portion of the one or more compressed data blocks.”

310. Claim 15 recites “storing at least a portion of the one or more compressed data blocks.” Ex. 1001, cl.15. A person of ordinary skill in the art would have understood that Ishii discloses this limitation of claim 15.

311. Ishii explains that “file compression portion 105 actually compresses data of the searched file to be compressed, so as to record it on the disk 131 in the file unit 130.” Ex. 1021 at 5:60-62. Therefore, files that are to be compressed are compressed and then stored (i.e., “recorded”) on the disk in Ishii’s file unit.

312. Based on the foregoing, and my reading of Ishii as a whole from the perspective of a person of ordinary skill in the art, Ishii discloses a method including a step of “storing at least a portion of the one or more compressed data blocks” as required by claim 15. Ex. 1001, cl.15.

8. *Claim 24 Would Have Been Obvious Over the Combined Teachings of Ishii and Koz as Understood By a POSITA*

313. Claim 24 refers back to claim 15. *See* Ex. 1001, cl.24. I have already explained how Ishii in view of Koz would have rendered the subject matter of claim 15 obvious to a person of ordinary skill in the art. Claim 24 further requires a step of “selecting the one or more asymmetric compressors based upon the determined parameter or attribute and a number of reads of the at least the portion of the data block.” Ex. 1001, cl.24. As explained above in connection with my analysis of limitation [15[B]], it would have been obvious to select an asymmetric compressor based on the determined parameter or attribute of the data block based on the combined teachings of Ishii and Koz. And, for the reasons I explained above in connection with my analysis of claim 8, it would have been obvious to select the asymmetric compressor based on “a number of reads of the at least the portion of the data block” as required by claim 24 of the ’535 patent. Therefore, it is my opinion that the subject matter of claim 24 would have been obvious.

X. SECONDARY CONSIDERATIONS

314. At this time, I have not formed an opinion regarding any objective factors that the Board might consider in making a determination as to whether the claimed invention would have been obvious to a person of ordinary skill in the art since none appear in the various prosecution histories and I am not otherwise aware of any such secondary considerations. I understand that if the Patent Owner presents

evidence of objective factors that it argues support a finding of nonobviousness, I may be asked to review such evidence and to formulate an opinion.

XI. CONCLUSION

315. A number of prior art references, including those discussed above and as provided in the list of exhibits at the beginning of this declaration, show that the various claim elements of the challenged claims of the '535 patent were well known. For the reasons explained in detail above, in my opinion the challenged claims would have been in the possession of or obvious to a person of ordinary skill in the art from the disclosures in one or more of the prior art references discussed in detail above. In summary, a person of ordinary skill in the art would have been familiar with each of the commonplace claimed method steps through multiple references (including those cited herein) and would have been led to combine the various process steps with relative ease to practice the claimed methods.

316. I reserve the right to supplement my opinions in the future to respond to any arguments that Patent Owner or its expert(s) may raise and to take into account new information as it becomes available to me.

XII. DECLARATION IN LEIU OF OATH

317. 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 § 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon. If called to testify as to the truth of the matters stated herein, I could and would testify competently.

I declare under penalty of perjury that the foregoing is true and correct.

July 12, 2018

A handwritten signature in blue ink, appearing to read "Joseph P. Havlicek", with a stylized flourish at the end.

Joseph P. Havlicek, Ph.D.