

IN THE UNITED STATES DISTRICT COURT
FOR THE WESTERN DISTRICT OF PENNSYLVANIA

SIGHTSOUND TECHNOLOGIES, LLC,
Plaintiff, Counter-Defendant

v.

APPLE INC.
Defendant, Counter-Plaintiff.

Civil Action No. 2:11-cv-01292-DWA

Senior District Judge Donetta W. Ambrose

**PLAINTIFF SIGHTSOUND TECHNOLOGIES, LLC'S, EXPERT REPORT
OF JOHN SNELL ON VALIDITY**

Confidential Information
Subject to Protective Order

June 5, 2013
Date



John Snell



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I. Introduction

1. This report gives the opinions, and their underlying bases and reasons, about which I may testify at trial on behalf of SightSound Technologies, LLC (“SightSound”). This report further includes information regarding the validity of the asserted patents. This report also includes information regarding the asserted patents being entitled to a priority date of June 13, 1988. I reserve the right to respond to assertions made by Defendant’s expert witnesses or fact witnesses and to testify in rebuttal to evidence that Apple may present during trial.

2. I have been retained by SightSound to serve as an expert in this case. I expect to testify at trial regarding the matters set forth in this report if asked about these matters by the Court or the parties’ attorneys.

3. I am an engineer, and reside and work in San Geronimo, California. I specialize in the design and analysis of microelectronics, software, and systems for recording, playing, synthesis, processing and transferring of electronic media over electronic networks. I have over four decades of experience in electronics engineering, computer science, signal processing mathematics, and the engineering of audio, video and music. I have researched, designed, developed and analyzed the microelectronics and software of numerous digital music and video systems.

4. I studied at Carnegie-Mellon University from 1967–74. My interdisciplinary graduate work through the electrical engineering department at Carnegie-Mellon University was performed with a grant from the National Science Foundation. I earned my Bachelor of Science degree in Electrical Engineering and my Bachelor of Arts degree in Cybernetics (an interdisciplinary program, combining coursework in computer science, signal processing mathematics, physics, music analysis and composition, psychology and physiology of perception

as well as audio, video and electrical engineering) at Carnegie-Mellon University. I wrote my first computer program in 1968 on a mainframe computer at Carnegie-Mellon University, where I took courses in programming, including data structures and software design for real-time systems. I have programmed computers and media processing digital systems at all levels, from high-level code down to assembly language and microcode (including binary, octal and hexadecimal for debugging systems).

5. I worked on the development of a large multiprocessing system and a graphics display processor, as well as analog-to-digital and digital-to-analog audio converters in the Engineering Lab of the Artificial Intelligence Lab at Carnegie-Mellon University in the early 1970s. I co-designed the microelectronics and software of a real-time microwave (wireless) signal analyzer in the mid-1970s.

6. I am the founder (1976) and original editor of the COMPUTER MUSIC JOURNAL,¹ an academic publication of international research on the application of computer science, signal processing mathematics, electronics, software, physics, acoustics and psychology of perception to the composition, recording, editing, and processing of music. Publication of several books² resulted from the articles I collected and edited.

7. I also did research in digital audio and music processing at Stanford University from 1977–1980 at the Center for Computer Research in Music and Acoustics (CCRMA). I worked on the development of the third generation of the CCRMA mainframe computer for editing, signal processing, and playing digital music files, and our computer was connected to the ARPANET.

¹ COMPUTER MUSIC JOURNAL, MIT Press.

² Revised articles from the COMPUTER MUSIC JOURNAL with new articles edited by John Snell, John Strawn and Curtis Roads were published in 3 books: FOUNDATIONS OF COMPUTER MUSIC (MIT PRESS 1985), DIGITAL AUDIO ENGINEERING (Kaufmann 1985), and DIGITAL AUDIO SIGNAL PROCESSING (Kaufmann 1985).

8. I was a design engineer from 1980–86 at Lucasfilm Ltd., where we designed and developed the microelectronics and software of graphics-based multiprocessor supercomputers for recording, processing, synthesis, editing and transferring of digital music, voices, Foley, and sound effects. In addition to design of the programmable digital mixing console and solid state memory system of our Digital Audio Signal Processor (a.k.a. ASP and SoundDroid), I contributed to the architecture³ and use of higher-speed circuitry (change from noisy, slower TTL to faster, less noise-prone, ECL supercomputer integrated circuitry⁴) for real-time operation. Our ASP/SoundDroid system included static and dynamic random access semiconductor memory (RAM) as well as disk drives for storing digital audio. This multiprocessor system was designed so that multiple channels of digital audio could be transmitted over a private Ethernet (ASPnet) between the disk drives connected to the memory systems of the processors. Our Trio project was designed for editing digital audio and video with optical video disks.

9. I designed several real-time multiprocessing systems for processing digital media signals over the last few decades^{5 and 6} and wrote a book,⁷ which detailed my design of numerous architectures for processing audio and video. In 1989, I was invited to give an international

³ Contributions to the architecture included replacement of the traditional single-bus with a dual-bus for faster processing (since most calculations involve dual-operands), touch-sensitive, interactive graphics screen technology for ease of editing, and use of a hinged paging design for easy troubleshooting access to signals.

⁴ Emitter-coupled-logic (ECL) was a faster and cleaner method of electronics design than TTL. Electronic circuitry known as transistor-transistor technology (TTL) was commonly used for digital design in the 1970s and 1980s. Schottky TTL sometimes failed due to its electrical noise and reflections over lines connecting TTL chips. From troubleshooting experience with the noise generated by, and line reflections of, Schottky TTL in developing large digital systems in the 1970s, I realized the need for a faster and more reliable supercomputer technology. Speed was an essential ingredient for real-time processing of media during this period. However, I designed portions of our less speed-critical user interface with more energy-efficient CMOS (complimentary metal-oxide-semiconductor) integrated circuitry, which became the dominant technology for microprocessors.

⁵ John M. Snell, *Expandable Interactive Real-time Multiprocessor DSP*, PROCEEDINGS OF THE IEEE ASSP WORKSHOP ON APPLICATIONS OF SIGNAL PROCESSING TO AUDIO AND ACOUSTICS (IEEE Press 1989).

⁶ John Snell, *Professional Real-time Signal Processor for Synthesis, Sampling, Mixing & Recording*, PROCEEDINGS OF THE 83RD CONVENTION OF THE AUDIO ENGINEERING SOCIETY (Audio Engineering Society 1987).

⁷ John M. Snell, *Multiprocessor Architectures & Design Techniques for Media Signal Processing & Synthesis 1991–1995* (Timbre Engineering 1995).

presentation on real-time software design issues in programming multiprocessor systems,⁸ which was subsequently published by the Audio Engineering Society. In the 1990s, I worked on the design of a supercomputer chip and software for personal home computers, which enabled simultaneous processing of multiple streams of media. This integrated circuit with its software was designed to receive, decode and process digital video, digital audio and graphics while implementing modem connection to the Internet. These systems were designed with static and dynamic RAM (Random Access Memory) as well as non-volatile digital storage.

10. Over the last decade, I worked on the design of a multiprocessing supercomputer system which allowed customers to select their own movies and music over the Internet and have them transmitted from solid state memory to their home over the higher-fidelity cable TV and satellite dish (wireless) networks, including thousands of channels of high-fidelity digital audio and high-definition digital video. I also worked on the design/analysis of smartphone applications involving digital media. I have used the Internet and its predecessor, the ARPANET, since 1972⁹ for my research and development work in digital media. I have given lectures and engineering presentations at international conferences, research centers and universities.¹⁰

⁸ John M. Snell, *Multiprocessor DSP Architectures & Implications for Software*, AUDIO IN DIGITAL TIMES (Audio Engineering Society 1990).

⁹ For example, my first transmission of digital files of music instrument designs with scores to play them was from Carnegie-Mellon University to Stanford University in the early 1970s over the ARPAnet. This was years ahead of the less expressive MIDI standard.

¹⁰ I have given lectures and engineering presentations at Audio Engineering Society international conferences, International Computer Music Conferences, Institute of Electrical and Electronics Engineers (IEEE) International Conference on Signal Processing Applications and Technology, Stanford University, Institut de Recherche et Coordination Acoustique/Musique (IRCAM, Paris), University of California, Microprocessor Forum, Eastman School of Music, Northwestern University, DSPx (Digital Signal Processing Conference, San Jose, CA), IEEE Mini/Micro West (San Francisco), WCCF, Mills College and Carnegie-Mellon University.

11. My experience with music is not limited to microelectronics and software engineering. I have been a musician since early childhood, and my compositions have been played in concerts and over the radio, as well as in live theater and film soundtracks.

12. I served from 1992–95 on the Editorial Review Board of MICROPROCESSOR REPORT. I analyzed the internal design of state-of-the-art digital media processing chips and advanced memory technology for this highly-respected publication on integrated circuit design for electrical engineers and computer scientists.

13. I was honored by the Audio Engineering Society in 2000 with a Fellowship Award for innovative digital audio engineering design and valuable contributions to the advancement of audio engineering.

14. I have analyzed hundreds of patents since the early 1970s and have served as an expert witness in trial and deposition. I am being compensated at \$350/hour for my work on this case. My *curriculum vitae* is included in Exhibit A. I have not testified at trial or deposition in the past four years.¹¹

II. Summary of opinions

15. I understand that the patents in this case are U.S. Patent No. 5,191,573 and 5,191,573 C1 (collectively, “the ’573 patent”) and U.S. Patent No. 5,966,440 and 5,966,440 C1 (collectively, “the ’440 patent”). I refer to the ’573 and ’440 patents collectively in my report as the asserted patents.

16. SightSound contends that Defendant Apple Inc. (“Apple”) has infringed the patents. It is my understanding that Apple contends that the asserted patents are invalid.

¹¹ Since Exhibit B is not included because of the lack of testimony over the past four years, the next exhibit is Exhibit C.

17. If called as an expert witness, I expect to provide testimony concerning the validity and priority date of the asserted patents. I may also provide testimony regarding the prosecution history and reexamination history of the asserted patents.

18. Based on my analysis, I conclude that the asserted patents are entitled to a priority date of June 13, 1988.

19. I conclude that the patents are valid, and none of the prior art discussed in the Kelly report invalidates any of the asserted claims of the asserted patents.

20. It is my opinion that even if any of the cited prior art were found to render the asserted patents obvious, the asserted patents are nevertheless valid because of the commercial success of the patented invention in the marketplace.

21. My opinions are based on my general knowledge and over 4 decades of experience, particularly my expertise in the field of electrical engineering, including recording, processing, transmission/reception and storing digital audio and digital video. My opinions are further based on documents and information that I have considered during the preparation of this report, such as the asserted patents and related prosecution and reexamination histories, the claim construction order in this case as well as from *SightSound.com, Inc. v. N2K, Inc.*, Case No. Civ. A. 98-CV-118 (“N2K”), reprinted at 185 F. Supp. 2d 445 (W.D. Pa. 2002), and documents produced by Apple. A list of all the materials that I considered in forming my opinions is included in Exhibit C.

III. The asserted patents

22. I expect to testify at trial regarding the background of the technology to which the '573 and '440 patents relate and the problems they solved. This testimony will be based on my

review of these patents and their prosecution histories and my own specialized knowledge of this field of technology, acquired through my education and professional experience.

23. On March 2, 1993, the United States Patent and Trademark Office (“PTO”) issued United States Patent No. 5,191,573. The ’573 patent claims priority to an application, Serial No. 206,497, that was filed on June 13, 1988. The ’573 patent underwent reexamination, and the PTO confirmed the validity of all six claims of the ’573 patent by issuing a reexamination certificate, U.S. Patent No 5,191,573 C1, on November 30, 2010. No claims from the ’573 patent were amended or cancelled during reexamination.

24. The PTO further issued U.S. Patent No. 5,966,440 on October 12, 1999. The ’440 patent is a continuation of the application that gave rise to the ’573 patent and also claims priority to the same application, No. 07/206,497, that was filed on June 13, 1998. The ’440 patent also underwent reexamination. The PTO confirmed the validity of asserted claim 1, as amended, and the ’440 patent was amended to include new claims 64 and 95. The PTO issued a reexamination certificate, U.S. Patent No. 5,966,440 C1, on June 27, 2010.

25. According to the *CDNow* opinion, in 1995, Mr. Hair’s company, called Parsec, became the first entity to sell a digital audio song for download over the Internet and in April 1999, sold its first digital movie via the Internet.¹²

26. The ’573 and ’440 patents generally relate to the field of electronic sale and distribution of digital audio or digital video. More specifically, the patented technology pertains to selling or purchasing and transmission of digital audio or digital video via telecommunications lines to memory storage owned by a customer.

¹² *SightSound.com, Inc. v. CDNow, Inc.*, Case No. Civ. A. 98-CV-118 (“*CDNow*”)

A. The '573 patent

27. The '573 patent discloses a method to sell digital music and digital video files over a telecommunication line, allow the user to pay per file, download the file to his or her memory storage and play the file.

28. The asserted patents are directed to “a system and associated method for the electronic sales and distribution of digital audio or video signals, and more particularly, to a system and method which a user may purchase and receive digital audio or video signals from any location which the user has access to telecommunication lines.” '573 patent at 1:15–21.

29. In describing the sales, distribution and transferability of music at or prior to the critical date, the '573 patent discusses a number of drawbacks to then-current music media: records, tapes and compact discs (collectively, “the prior art media”). '573 patent at cols. 1–2. From a capacity standpoint, the '573 patent discloses that the prior art media was limited in the amount of music that can be stored on each unit. *Id.* at 1:27–29. The prior art media also limited a user’s ability to play, in a user-selected sequence, songs from different albums. *Id.* at 1:39–44. From a sales and distribution standpoint, the '573 patent describes the need to physically transfer compact discs, cassettes or records from the manufacturing facility to the wholesale warehouse to the retail warehouse to the retail outlet prior to final purchase, resulting in lag time between music creation and marketing as well as the resulting transfer and handling costs. *Id.* at 1:38–45. Before the '573 patent, customers were required to physically go to retail locations to get selected songs. *See Id.* at 1:55–63.

30. The claimed invention of the asserted patents provides an improved methodology to electronically sell, distribute, store, manipulate, retrieve, play and protect distortion-free digital audio and video files. *Id.* at 2:23–44. The benefits of this invention include the high

speed transfer of digital audio and video files for storage, easy recall of stored music for playback as selected or programmed by the user, changing the playback order of stored music based on different criteria, such as music category, artist, or user's favorite songs, and the random playback of music based on the user's selection. *Id.* at 2:44–61.

31. For protection from piracy, the '573 patent discloses that digital audio and video files can be transferred from a source authorized by the copyright holder to sell and distribute the digital files. *Id.* at Fig. 1 & 2:55–58. In short the claimed invention provides a new method of selling and distributing music over telecommunications lines, that reduces the time between music creation, music marketing and music sale. *Id.* at 2:65–3:2.

B. The '440 patent

32. The '440 patent is based on the same application as the '573 patent and shares the same specification as the '573 patent. The claims of the '440 patent—while different from the claims of the '573 patent—are directed to the same general subject matter as the '573 patent—the sale and distribution of digital audio and digital video files.

IV. Level of ordinary skill

33. I am informed that this Court has ruled that the level of ordinary skill is “an undergraduate degree in electrical engineering or computer science and/or approximately 2–4 years of industry experience in the design of systems and methods for storing and transmitting digital information.”¹³ I consider myself to be a person of at least ordinary skill in the art under this definition, and I believe my credentials qualify me to opine as an expert on the perspective of a person of ordinary skill in the art (as defined by this Court) at the time of the invention.

V. Claim construction

34. I understand that this Court construed the claims of the asserted patents.

¹³ Special Master's Rept. & Recommendation on Claim Construction at 12, n.12.

35. This Court's constructions are reproduced in the table below:

Term	Construction
"first party"	A first entity, whether a corporation or a real person.
"second party"	A second entity, whether a corporation or a real person.
"first party control unit"	Control unit of the first party.
"second party control unit"	Control unit of the second party.
"telecommunications lines"	An electronic medium for communicating between computers.
"telephone lines"	An electronic medium for telephonic communication.
"electronic" terms	Pertaining to devices or systems which depend on the flow of electrons.
"connecting electronically" terms	Connecting through devices or systems which depend on the flow of electrons.
"transferring electronically" terms	Transferring through devices or systems which depend on the flow of electrons.
"transferring money electronically" terms	Providing payment electronically (i.e., through devices or systems which depend on the flow of electrons).
"charging a fee" terms	Requesting payment electronically.
"electronically selling" terms	Providing a product or service electronically in exchange for providing payment electronically.
"digital audio signal"	Digital representations of sound waves.
"hard disk" / "hard drive" terms	A permanent, rigid, magnetic storage device.

Term	Construction
“replica”	A copy, not requiring a complete copy to be stored at one time.
“second party hard disk”	Non-volatile storage portion of the second memory.
“desired signals” and “desired selections”	Chosen signals and chosen selections.
“transferring means or mechanism”	Means or a mechanism for the first party to charge a fee.
“means or mechanism for storing the signals”	The control integrated circuit, which has been configured to effect the storing of digital signals into the memory.

36. I understand that many claim terms from the asserted patents were also construed by the *N2K* court. I have considered and relied on the *N2K* claim constructions to the extent that the *N2K* court’s reasoning has been adopted in the claim construction order in this case. For example, in construing the “transferring money electronically” terms, I am informed from the Special Master’s Report and Recommendation that there was no new evidence or arguments that affected the viability of the *N2K* claim construction. Thus, in applying the “transferring money electronically” terms, I relied on the *N2K* claim construction order which held that the construction of “transferring money electronically” included, but was not limited to, “providing authorization to charge a credit card account.”¹⁴

37. I have applied any additional claim limitations that were not included in this Court’s claim construction order as a person of ordinary skill in the art would have understood them at the time of the invention (in June 13, 1988).

¹⁴ 185 F. Supp. 2d at 473.

38. The claim terms construed in the *N2K* litigation but not in this Court’s claim construction order are reproduced in the table below. While I did not strictly apply the *N2K* constructions, I considered the *N2K* constructions in analyzing how a person of ordinary skill in the art would have understood the claim terms at the time of the invention.

Term	Construction
“control”	Authority to direct.
“possession”	Holding as property.
“providing a credit card number . . . so the second party is charged money”	Transferring money electronically.
“sales random access memory chip” / “incoming random access memory chip” / “playback random access memory chip”	Any RAM in a system which is configured to perform the function specified, whether or not that is the only function it is configured to perform.
“before the forming step . . . commanding the second integrated circuit . . . to initiate the purchase”	No limitation requiring that a request be ‘formulated’ or that the command be personally entered by the second party.
“control integrated circuit”	A microelectronics device which is capable of performing the functions identified in the patents.
“regulate the transfer”	The first party and second party integrated circuits control the transfer of the digital signals, i.e., control the transmitting and receiving of such signals.
“electrical communication”	Requiring a hard-wired conduction path (as to elements at the same site).
“individual songs”	A subset of “digital audio signals”.
“temporary staging areas”	The random access memory chip being used for that purpose.

Term	Construction
“means or a mechanism for transmitting the digital audio signals from the first memory to the second memory”	A transmitter connected to a properly programmed control integrated circuit.
“telephoning the first party . . . by the second party”	Not requiring a person-to-person restriction, and not excluding the use of machines on either or both ends of the telephone communications.

VI. The asserted claims of the '573 patent are not invalid for a lack of written description, and all asserted claims are entitled to a priority date of June 13, 1988.

39. The Kelly report argues that the asserted claims of the '573 patent are invalid for failing to meet the written description requirement because the disclosure of the '391 application purportedly does not support the claimed “telecommunications line.”¹⁵ The Kelly report further argues that the claims of the '440 patent are not entitled to a priority date of June 13, 1988, for the same reason. I disagree with the Kelly report’s conclusions because the Kelly report ignores the disclosure of the '391 application and suffers from hindsight bias—even relying on several materials that post-date June 13, 1988—to arrive at an incorrect understanding of the state of the art in June 13, 1988. The written description of the '391 application fully supports the asserted patents’ claiming a “telecommunications line.”

40. The '391 application discloses several representative examples of “telecommunication lines,” including, transferring data over telephone lines and well-known computer network architectures. Well-known computer network architectures at the time included store-and-forward packet-switched networks, peer-to-peer networks; and ring-

¹⁵ It is my understanding that between the Kelly report and the Sofocleous report, the only issue raised is whether the disclosure of the '391 application is sufficient to support the claiming of “telecommunications lines.”

structured networks. The representative examples of “telecommunication lines” sufficiently convey that Mr. Hair’s invention was directed to the entire group of telecommunication lines in June 13, 1988.

41. The ’391 application discloses structural features common to all telecommunications lines such that those of skill in the art would recognize that any type of telecommunications line would be suitable for use with the claimed invention.

A. Disclosure of the 1988 application and prosecution history of the asserted patents

42. As the Kelly report’s argument related to the priority of the asserted patents is only directed to the written description requirement based on a comparison of “telephone lines” and “telecommunications lines,” I will only discuss those facts pertinent to that comparison.

43. Arthur Hair, the named inventor of the asserted patents, filed a patent application on June 13, 1988.¹⁶ The Patent Office assigned the patent application Serial No. 206,497.¹⁷ While that application was still pending, Mr. Hair filed another patent application on September 18, 1990, and the patent office assigned the application Serial No. 586,391 (“the ’391 application”).¹⁸

44. Mr. Hair was the only named inventor on both applications.¹⁹

45. During the prosecution of the ’391 application, Mr. Hair amended the specification.²⁰

46. On February 24, 1992, Patent Examiner Nguyen rejected the claims of the ’391 application on the ground that the amendments constituted new matter that would prevent a

¹⁶ Patent Application Transmittal Letter from file history of the ’573 patent (Jun. 13, 1988) (File History at 4).

¹⁷ ’573 pat. at cover.

¹⁸ ’573 pat. at 1:5–6.

¹⁹ File history at 1, 73.

²⁰ E.g., File history at 38.

claim of priority.²¹ While Examiner Nguyen couched this rejection in terms of a § 112 rejection, the text of the rejection indicates that the rejection was a new matter objection:

The step of “transferring money”, the phrase “second party financially distinct from the first party” in the controlling step, the phrase “said receiver in possession...of the second party” recited in claims 11 and 15 and the step of telephoning and providing credit card recited in claim 22 do not have basis in the original specification.”²²

47. Examiner Nguyen’s withdrew this rejection after receiving and considering a declaration from Mr. Hair that indicated, in part, that “The use of transferring money across telecommunication connections, such as by telephoning the agent who has the hard disc over the phone lines, for obtaining data on the hard disc is well known to one skilled in the art to be part of electronic sales.”²³

48. Because the Patent Office allowed the ’573 patent to issue—and withdrew its rejection that the claims were not supported by the original specification—the Patent Office confirmed that claims of the ’573 patent were entitled to claim priority to the June 13, 1988, application.

49. An embodiment of the disclosed system is shown in Figure 1 of the ’391 application. One of ordinary skill in the art would understand that each control unit connected to RAM, telephone lines and hard disk would run an operating system with a file system to manage the hard disk and execute commands. The computer functionality of the sales agent control unit and the user control unit is supported in the ’391 application spec.

2) the Control Integrated Circuits 20b and 50b would be designed to control and execute the respective commands of the agent and user and regulate the electronic transfer of Digital Audio Music throughout the system, additionally, the sales Control Integrated

²¹ File history at 147–48.

²² File history at 147 (emphasis added).

²³ File history at 170 (emphasis added).

Circuit 20b could electronically code the Digital Audio Music in a configuration which would prevent unauthorized reproductions of the copyrighted material²⁴

1) the Control Panels 20a and 50a would be designed to permit the agent and user to program the respective Control Integrated Circuits 20b and 50b²⁵

50. One of ordinary skill in the art would understand that a programmable control unit running a file system to manage files on a hard disk, and an operating system to execute commands for different tasks is a computer. Thus the '391 application discloses that the claimed invention transmits data and information between two computers.

51. The '391 application discloses multiple types of telecommunications lines. The Court construed telecommunications line to mean "an electronic medium for communicating between computers." As described above, two computers are disclosed communicating over a telecommunication line in Fig. 1 of the '391 application.

52. I agree with the Kelly report's statement that the '391 application discloses telephone lines, one medium that can be used as a telecommunications line. The '391 application also discloses using input transfers to transmit data between two computers.

53. This issue was discussed by Mr. Hair at his deposition:



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54. Those of ordinary skill in the art at the time of the invention would understand the '391 application's disclosure of input transfer²⁷ as a disclosure of data transmission over well-

²⁴ '391 application at 4 & Fig. 1 (emphasis added).

²⁵ '391 application at 4 & Fig. 1 (emphasis added).

²⁶ Hair Dep. at 59:22-66:14.

known computer network architectures. Well known computer network architectures at the time, included: (1) data communication networks (packet-switched) with store-and-forward exchange nodes; (2) peer-to-peer networks; and (3) ring-structured networks.

55. The '391 application discloses using the telephone lines/input transfer 30 to transfer data: "The Control Unit 20 of the authorized agent is the means by which the electronic transfer of the Digital Audio Music from the agent's Hard Disk 10 via the Telephone Lines 30 to the user's Control Unit 50 is possible."²⁸ These input transfer lines 30 enable the "transfer of Digital Audio Music throughout the system."²⁹ The '391 application further discloses that "electronic sales/and distribution of the [digital audio] music can take place via telephone lines onto a hard disk."³⁰

56. In sum, the '391 application discloses the following structural elements of telephone lines and input transfers: (1) they should be able to support the transfer of digital data in the form of digital audio and video; (2) they should be able to support electronic sale and distribution of digital audio and digital video and (3) they should connect two computers and allow communication between them.

B. Legal Standard

57. I understand that a patent may not claim priority to an earlier application unless the earlier application provides an adequate written description of the claims of the issued patent. I understand, in other words, that the prior application must describe an invention in sufficient

²⁷ The Kelly report ignored the '391 application's disclosure of input transfers and instead focused on telephone lines. The Kelly report's conclusion related to written description, was, therefore, unreliable because it ignored critical evidence that was apparent from both Mr. Hair's deposition and the disclosure of the '391 application.

²⁸ '391 application at 3; *see also* '391 application at 4 ("the Sales Random Access Memory Chip 20c would be designed to temporarily store user purchased Digital Audio Music for subsequent electronic transfer via telephone lines to the user's Control Unit 50").

²⁹ '391 application at 4.

³⁰ '391 application at 2.

detail to reasonably convey to those of ordinary skill in the art that an inventor had possession of the claimed subject matter as of the filing date.

58. I understand that one general rule is that a disclosure of a structure provides sufficient written description support for a later-filed claim directed to a class of structures including the disclosed example. To determine whether a particular specification is an exception to this general rule, I understand that I am to analyze whether the disclosure of the earlier application reasonably conveys the entire class, either (a) because it discloses a representative number of examples falling within the scope of the class, or (b) because it discloses structural features common to the class. In either case, the disclosure of the earlier application should allow those of skill in the art to visualize or recognize the members of the class.

59. In performing this analysis, I understand that I am to take into account the following: (1) the existing knowledge in the field; (2) the extent and content of the prior art; (3) the maturity of the science or technology; (4) the predictability of the aspect at issue; and (5) the nature and breadth of the class. I understand that if the difference between members of the class is such that those skilled in the art would recognize that other members of the class would perform similarly to the disclosed members, then disclosure of more members is unnecessary to adequately show possession of the entire class.

60. Thus, with respect to the Kelly report's contention as it relates to written description, I understand that I am to analyze the disclosure of the '391 application to determine whether the disclosure of the '391 application reasonably conveys to those of skill in the art that Mr. Hair had possession of "telecommunication lines" in June 13, 1988. I understand that I am to evaluate the '391 application to determine if the '391 application contains a sufficient number

of representative examples of “telecommunications lines.” I am also to analyze if the ’391 application discloses structural features common to the class of “telecommunications lines.”

C. **Analysis**

1. **The ’391 application discloses a sufficient number of representative examples to convey possession of “electronic mediums of communicating between computers.”**

61. As discussed above, the ’391 application discloses two representative examples of transmission mediums: telephone lines and computer networks. As of June 13, 1988, those of ordinary skill in the art would readily recognize “input transfer” as a way to transmit data over computer networks. For example, U.S. Patent No. 4,032,899³¹ (Jenny) discloses using input transfers to transmit data in a store-and-forward node of a data communication network between various computers (or processor and storage modules (PSMs))³²:

(c) Data Packet Buffering

After a storage section has been allocated groups of four received characters (bytes) of the data packet are transferred by internal transfer blocks (data format ITB’s) to the accepting processor module and queued in input buffer 31. By reference to the contents of storage allocation tables 35 addressing circuitry 39 accesses the storage section in storage 41 allocated for the associated data packet and the four byte groups are transferred into storage 41 through input transfer circuitry 43. This is repeated until the complete data packet is contained in storage 41.³³

³¹ U.S. Patent No. 4,032,899 (Jenny) issued on June 28, 1977, to IBM. Jenny lists Christian Jakob Jenny and Karl Albert Kuemmerle as named inventors.

³² Jenny at 4:9–21:

SYSTEM

FIG. 1 shows the principal design of a switching node in which the present invention is used. Relative to any port the node can be either a terminal node (origin or termination node) or a transit (intermediate) node. It comprises three different kinds of modular functional units which are designated in the following as “modules”:

- line attachment module LAM
- processor and storage module PSM (designated in the following “processor module”)
- node control module NCM

³³ Jenny at 12:18–29 (emphasis added).

62. Jenny further discloses “input transfer means for transferring data from any port, relative to which the respective module has been assigned packet storage responsibility, to a location in the respective storing means designated by said designating means.”³⁴

63. These examples from Jenny confirm that those of ordinary skill in the art understood how to use input transfers to transfer data sent over a computer network communications channel into computer storage.

64. U.S. Patent No. 4,489,379 (Lanier)³⁵ offers additional evidence that those of ordinary skill in the art understood “input transfer” as a way to transmit data over a computer network. Lanier is directed to the field of data communication networks and discloses:

In a ring-structured data communication network, in which plural data processing systems exchange data and control information on a full duplex peer to peer basis, systems are presently architected to assign at least three I/O subchannels (i.e. at least three device addresses) to respective ring interface adapters. At least two of these subchannels are dedicated for providing separate input paths from the ring to at least two associated program-assignable areas in their system's main store, and a third of these subchannels is dedicated as an output path from the system's store to the ring. Collectively, these subchannels can sustain two input transfer processes and one output transfer process concurrently. One of these input processes is associatable with a locked mode of adapter operations which provides a non-blockable path for data transfer from a selected (remote) station on the ring to the respective system's main store. In this mode the other input subchannel and the output subchannel permit the system to maintain full duplex communication with other ring stations in respect to network transactions/processes which may require priority attention. Information is sent on the ring in discrete information frames of variable bit length, each frame acknowledged by a response frame. In general, response frames have much shorter bit lengths than the information frames, enabling the systems to access the ring more

³⁴ Jenny at claim 6.

³⁵ U.S. Patent No. 4,489,379 (Lanier) issued on December 18, 1984, to IBM. Lanier lists Charles Lanier, Hiram Maxwell, Roger McKay and Leonard Weiss as named inventors.

efficiently than they would be able to if response and information frames had equal lengths.³⁶

65. Lanier further discloses that input transfers are used to transmit data in a computer network to and from host storage:

Furthermore, each host processing system in accordance with this invention is architected to dedicate at least two of its input subchannels and at least one output subchannel for separately conducting communications between its main store and the ring. In other words, each station system is architected to assign at least three device addresses to its ring communication adapter, at least two of these addresses exclusively for conducting input transfers from the ring to its host store and one address for conducting only output transfers to the ring.³⁷

66. Like the Ethernet specification discussed in the Kelly report,³⁸ the input transfer accommodates “bursty” and asynchronous transfers in ring-structured networks.³⁹ As evidenced by Jenny, those of ordinary skill in the art would understand how to use input transfers to transmit data in a packet-switched store-and-forward network—like the networks described in the Kelly report in which “the same network path may not be used to transfer all the data associated, with for example, a file transfer” or where “[d]ifferent network paths may be made and used to transmit portions of the file.”⁴⁰ Those of ordinary skill in the art would further understand that input transfers could similarly be used for “distributed data processing” and “terminal access” in computer networks.⁴¹ Those of ordinary skill in the art would understand

³⁶ Lanier at abstract (emphasis added).

³⁷ Lanier at 5:59–68; *see also* Lanier at 7:22–30 (“Channel 110 contains plural subchannels 111. As explained previously, at least two of these subchannels (only two in the presently disclosed embodiment) are dedicated exclusively as input subchannels for conducting input transfers from the ring R to host storage (via the In Buffer), and another one of these subchannels is dedicated as an output subchannel only for conducting output transfers from host storage to the ring (via the Out Buffer).” (emphasis added))

³⁸ Kelly report at ¶¶ 204, 207–08.

³⁹ Lanier at 1:44–53.

⁴⁰ Kelly report at ¶ 204.

⁴¹ Kelly report at ¶ 207; Lanier at 1:1–7 (distributed data processing); Jenny at 4:27–38 (terminal stations).

that input transfers are used in environments where “a fixed bandwidth is not reserved for the exclusive use of a network path.”⁴²

67. As evidenced by Jenny and Lanier, both of which issued long before June 13, 1988, those of ordinary skill in the art would readily recognize “input transfers” as a disclosure of transmitting data over various types of computer networks such as packet-switched, store-and-forward computer networks (Jenny), ring-structured networks (Lanier) and peer-to-peer computer networks (Lanier).

68. Thus, the disclosure of an input transfer addresses the supposed deficiencies in the disclosure of the '391 application identified by the Kelly report.⁴³ The disclosure of an input transfer is a disclosure of a computer network, such as a packet-switched store-and-forward network or a ring-structured network, and the disclosure of these computer networks would have conveyed (to those of skill in the art on June 13, 1988) the very features that the Kelly report believes to be necessary to support a “telecommunications line”: asynchronous and non-simultaneous communications; bursty communications; communication without fixed bandwidth; sharing of data and information; support for distributed data processing and terminal

⁴² Kelly report at ¶ 204; Lanier at 11:9–19:

With either successful or unsuccessful conclusion SC0 is placed in the unprepared (disarmed) condition. If a local-destination request frame arrives while SC0 is disarmed the frame is rejected with a frame refused response. Accordingly, if the host system software is supposed to minimize such refusals (in order to conserve ring bandwidth) the software should be designed to rearm SC0 quickly (as soon as possible after receiving the concluding status). Of course, this aspect of software operation is not relevant to the present invention.

One of ordinary skill in the art would recognize that there is only a need to conserve ring bandwidth in an environment where there is not a fixed bandwidth allocation.

⁴³ The Kelly report also analyzed additional evidence related to AppleTalk and LocalTalk that relied on evidence that post-dates June 13, 1988. Because that evidence post-dates the date of June 13, 1988, it is my understanding that I am not to look to that evidence as part of my analysis of the written description. For the sole purpose of responding to the Kelly report, I note that the AppleTalk protocol supported ring-structured networks, such as Token Ring. Kelly report, Ex. X.

access. Therefore, I conclude that the '391 application fully supports the '573 and '440 patents' claims use of the term "telecommunications lines."

2. The '391 application's disclosure of telephone lines also conveys possession of "telecommunications lines."

69. Furthermore, the '391 application's disclosure of telephone lines was also sufficient to reasonably convey to those of skill in the art that Mr. Hair had possession of the asserted claims as applied to "telecommunications lines" in June 13, 1988. As discussed above, I understand that I am to take into account the following in determining whether a specification contains sufficient written description to support a claim term: (1) the existing knowledge in the field; (2) the extent and content of the prior art; (3) the maturity of the science or technology; (4) the predictability of the aspect at issue and (5) the nature and breadth of the class. I understand that if the difference between members of the group is such that those skilled in the art would recognize that other members of the group would perform similarly to the disclosed members, then disclosure of more examples is unnecessary to adequately show possession of the entire group.

70. As it relates to the asserted claims and the disclosure of the '391 application, "telephone lines" were used to provide the following functionality: (1) transferring digital data in the form of digital audio and video between computers;⁴⁴ (2) transferring information related to providing payment between computers⁴⁵ and (3) transferring information related to requesting

⁴⁴ '391 application at 3 ("The Control Unit 20 of the authorized agent is the means by which the electronic transfer of the Digital Audio Music from the agent's Hard Disk 10 via the Telephone Lines 30 to the user's Control Unit 50 is possible.").

⁴⁵ '391 application at 2 ("Inasmuch as Digital Audio Music is software and this invention electronically transfers and stores such music, electronic sales and distribution of music can take place via telephone lines onto a hard disk.").

payment between computers.⁴⁶ The '391 application does not disclose the need for any particular performance characteristic of telephone lines that is necessary to practice the asserted claims. The '391 application does not criticize any prior art for using particular types of telecommunications lines instead of telephone lines. It is of no consequence to the teachings of the '391 application (or to any of the asserted claims) whether the medium of communication (1) is bursty, (2) supports fixed or variable bandwidth, (3) is more suitable for high-speed transfer, (4) supports the ability to connect to peripherals, (5) allows for different network paths or (6) allows non-simultaneous transfer.⁴⁷ That is, these six performance characteristics are certainly within the scope of the invention, but there is nothing in the '391 application or the asserted claims to suggest that they are required by, or play a role in, any of the asserted claims.

71. Thus, contrary to the Kelly report's conclusion, telephone lines perform similarly to LocalTalk, AppleTalk and Ethernet with respect to the disclosed functionality and claims. Therefore, the patentee's disclosed examples were enough to show possession of the entire group of "telecommunications lines."

72. Even though these other performance characteristics of some telecommunications lines noted by the Kelly report are not required for the asserted patent claims, those of ordinary skill in the art on June 13, 1988 were aware of them. Well before June 13, 1988, companies were already working to bring packet-switched telephone networks to the market.

A digitized, packet-switched telephone network is coming.

This network will combine the enormous bandwidth of fiber-optic cable and the spectacular signal-processing power of very large-scale integrated (VLSI) circuits to produce a smorgasbord of services — voice, data and video — that will

⁴⁶ '391 application at 2 ("Inasmuch as Digital Audio Music is software and this invention electronically transfers and stores such music, electronic sales and distribution of music can take place via telephone lines onto a hard disk.").

⁴⁷ Kelly report at ¶¶ 203–212.

boggle the mind of even the most visionary telecommunications manager.

Why packet switching? In Bell Communications Research, Inc.'s (Bellcore) view of broadband communications, the principal future challenge to the telephone companies will be to transmit huge volumes of different types of information instantaneously and accurately.

* * *

While it may be a relatively new concept, bursty telephone traffic is not a new phenomenon. Voice traffic is characteristically interspersed with long silences, and it generally occupies only half a circuit, even during active conversations. . . .

This propensity toward burstiness exists in video traffic, and is exceedingly strong for data — so strong, in fact, as to represent a qualitative change.

Fortunately, packetized information does not require the network to maintain an open circuit. Each parcel of information finds its way through the network, then disappears, taking its “circuit” with it.

Channel capacity required for only a portion of a transmission is encumbered only during that portion, leaving the channel free to carry other traffic the rest of the time. The result is sharp reductions in hardware and operating costs.⁴⁸

73. Thus, those of ordinary skill in the art before June 13, 1988, were already aware that telephone lines/telephone networks could be implemented as packet-switched networks, allowing for bursty transmission, virtual circuits and variable bandwidth utilization, contrary to the Kelly report's assertion.⁴⁹ This is further evidenced by a number of companies, including

⁴⁸ David Sincoskie, *Packet-switched smorgasbord*, NETWORK WORLD (Nov. 10, 1986) (available online at <http://books.google.com/books?id=Dx4EAAAAMBAJ&pg=PA31#v=onepage&q&f=false>).

⁴⁹ In pointing to the fixed bandwidth characterization of phone lines, the Kelly report relies on a book written by Sidnie Feit called WIDE AREA HIGH SPEED NETWORKS. Kelly report at ¶ 203. The Feit book was published in 1999, and thus should not be considered as part of the written description analysis because it would not be relevant to determining what those of ordinary skill in the art would understand to be disclosed by “telephone lines” in 1988. The use of post-1988 evidence throughout the Kelly report highlights that the Kelly report uses hindsight in its analysis.

It appears that the Feit book used an archaic description of telephone networks, so the Kelly report's conclusions based on the Feit book are unreliable for this additional reason.

Nortel⁵⁰ and Motorola⁵¹ who were researching and implementing packet-switched technology and applying it to existing telephone networks.

74. In addition, those of ordinary skill in the art understood at the time that even though parts of the telephone network were implemented in copper wiring, other portions of the telephone network were implemented using satellite and microwave transmission, and further understood that existing copper telephone lines and telephone networks provided for digital packet switching networks using time division multiplexing that allowed for variable network paths:

Telephone systems in the United States and in many other countries were originally designed solely for the transmission of analog voice signals between subscriber locations and a central office. At the central office, signals from and to the various subscriber loop locations are handled by suitable switching systems. Connection between the central office and each subscriber location is typically by means of a single subscriber loop - usually a twisted pair of insulated copper wires.

With the coming of the "information age," telephone companies have sought ways to increase the level of service to their subscribers. One way of doing this is to increase the capacity of subscriber-to-central office communication by adding subscriber loops. As one might imagine, however, the cost of installing additional subscriber loops in an existing telephone system for all subscribers is prohibitive.

Many telephone companies have, accordingly, explored the use of digital signalling techniques along with multiplexing in order to transmit more information into signals traveling between subscribers and the central office. Since digital transmission techniques via microwave and other long distance signalling systems are already employed, and in as much as digital switching is utilized in many modernized central offices, the digitizing of the subscriber loop affords evident advantages.⁵²

⁵⁰ U.S. Patent No. 4,608,685 (Jain) (disclosing a telecommunications network that was operable in both circuit switched and packet switched modes).

⁵¹ U.S. Patent No. 4,887,265 (Felix) (disclosing an improved packet-switched cellular telephone system).

⁵² U.S. Patent No. 4,750,169 (Carse).

75. Well before June 13, 1988, those of skill in the art already understood using virtual circuits to implement digital transmission over telephone networks in order to conserve bandwidth:

In the speech interpolation which is undertaken in the known TASI method, a respective channel is through-connected for an appertaining voice connection when there is actual speaking in the appertaining direction. In all other time intervals, the channel capacity is available for further, individual voice connections.

The invention offers the advantage that the method of speech interpolation which is known per se can be employed in arbitrarily-designed telephone networks provided for the transmission of digital speech signals in order to save channel capacity without inadmissibly long transit times occurring between the subscribers.⁵³

76. In addition, those of ordinary skill in the art were superimposing digital transmissions on-top of existing analog signals for purposes of integrated service data network (ISDN) transmissions:

Recent developments in telecommunications technology have lead to digital telecommunication systems which provide a conversion of the voice signals into digital signals, and vice-versa, for the telephone subscriber in the subscriber station and in which digital telephone connections can be completed by way of digital four-wire switching centers in uniform communication channels with a bit rate of, preferably, 64 kbit/s (per transmission direction), whereby a signaling connection for so-called "out-slot" signaling can constantly consist out of ("out-slot") the 64 kbit/s communication channel in an additional signal channel (subscriber signal channel) with a bit rate of, for example, 8 kbit/s (per transmission direction) (ISS'79, 773, 777; telcom report 2 (1979) 4, 254, 259). In addition to speech, text, data and images can also be transmitted; such a transmission and switching of the digital signals is to be expected in a future integrated services telephone network (ISDN).

At present, and in the near future, the two-wire switching centers standard today in the analog telephone network are employed, in the meantime, both for local switching centers and

⁵³ U.S. Patent No. 4,433,411 (Gefroerer) at 1:39-44 and 2:47-52.

for private branch exchange (PBX) systems, analog telephone subscriber stations provided with an analog hybrid terminating the two-wire line branch being connected to the two-wire switching centers via two-wire branch lines respectively having a signaling circuit in the two-wire line branch. Upon introduction and further perfection of an integrated services digital network, a large number of such telecommunication systems will therefore already be in operation in the framework of the traditional analog telecommunication network, and the present invention discloses a way to be able to expediently exploit the advantages of digital communication methods.

In this context, it is already known (NTF 73, 1980, pp. 36–40) to superpose a 96 kbit/s digital communication channel lying above the telephone band upon the analog telephone channel of a telecommunication subscriber station connected to a two-wire branch line, in that the two-wire branch line is terminated by a diplexer to whose low pass filter branch the standard analog telephone device is connected and to whose high pass branch a digital transmitting/receiving circuit is connected via an adaptive hybrid in the form of a bridge circuit connected to an echo compensator. Such a telecommunication subscriber station seems relatively involved insofar as, in addition to a diplexer operating as a frequency multiplexer/demultiplexer, a respective hybrid to be realized by a bridge circuit must also be provided, both in the low pass branch and in the high pass branch, whereby the bridge circuit in the high pass branch which is too narrow-banded per se must be augmented by an echo compensator.⁵⁴

3. **The '391 application discloses sufficient structural features that would allow those of skill in the art to visualize the types of “telecommunications lines.”**

77. As discussed above, the '391 application's disclosure of telephone lines was a disclosure of sufficient structural features—the ability to transmit various types of information (such as digital audio, digital video and payment information) between two computers—that would allow those of skill in the art to visualize the types of telecommunications lines. This conclusion is evidenced by this Court's construction, where this Court has construed “telecommunications lines” to mean “an electronic medium of communication between

⁵⁴ U.S. Patent No. 4,449,218 (Strehl) at 1:53–2:37.

computers.” Thus, as even this Court’s construction recognized, the ’391 application discloses sufficient structural features that would reasonably convey possession of the entire group of “telecommunications lines” to those of ordinary skill in the art in 1988.

VII. The asserted patents are valid over the prior art.

78. I conclude that the asserted patents are valid over the prior art. The Kelly report does not identify the subsection under § 102 under which the prior art supposedly anticipates the prior art. I understand that this alone is sufficient to render his anticipation analysis suspect—as the different subsections require different elements to be proven (for example, comparing different dates of priority). Based on my analysis of the evidence discussed in the Kelly report, I conclude that there is not sufficient evidence to conclude that the Ball system, Ball U.S. application, the Ball European application, the PAN Network and the Yurt patent are prior art to the asserted patents. Additionally, each of these references (even if they could be considered prior art) is missing one or more claimed features and, thus, cannot anticipate any of the asserted claims.

79. Second, I further conclude that none of the references analyzed in the Kelly report anticipates any of the asserted claims.

80. Third, none of the prior art analyzed in the Kelly report, alone or in combination with the other included references, renders any of the asserted claims obvious.

A. Legal Standard

81. As an expert assisting the Court in determining validity, I understand that I am obliged to follow existing law. I have therefore been asked to apply the following legal principles to my analysis, and I have done so.

82. For a claim to be anticipated, every limitation of the claimed invention must be found in a single prior art reference, either expressly or inherently, arranged as in the claim.

83. For a claim element to be inherently present in a prior art reference, the element must be “necessarily present” in the disclosed apparatus, system or method, not merely probably or possibly present.

84. A patent claim cannot be anticipated by a prior art reference if the allegedly anticipatory disclosures in the reference are not enabled.

85. A claim is invalid for obviousness if differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. To be properly applied as an obviousness or anticipation reference, the reference must predate the invention of the subject matter of the claim, unless a statutory bar applies.

86. In determining whether a claimed invention is obvious, one should consider the scope and content of the prior art, the level of ordinary skill in the relevant art, the differences between the claimed invention and the prior art, and whether the claimed invention would have been obvious to one of ordinary skill in the art in light of those differences.

87. I understand that an invention composed of several elements is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art. To show obviousness, I understand that it is important to identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way the claimed new invention does.

88. I also understand that generic evidence that bears no relation to any specific combination of prior art elements is not sufficient to show obviousness. I understand that there must be an explanation as to why a person of ordinary skill in the art would have combined elements from specific references in the way the claimed invention does.

89. I understand that certain objective factors, sometimes known as “secondary considerations” must be taken into account in determining whether a claimed invention would have been obvious. Such secondary considerations include: (1) copying of the invention and (2) commercial success of the invention—including a patentee’s products, or that of infringing products.⁵⁵

90. The person of ordinary skill is a hypothetical person who is presumed to be aware of all of the pertinent art. The person of ordinary skill is not an automaton, and may be able to fit together the teachings of multiple prior art references employing ordinary creativity and the common sense that familiar items may have obvious uses beyond their primary purposes. It is not necessary to demonstrate precise teachings directed to the specific subject matter of the challenged claim, for a court can take account of the inferences and creative steps that a person of ordinary skill in the art would employ. A patent which merely claims predictable uses of old elements according to their established functions to achieve predictable results may be found invalid as obvious.

91. In establishing obviousness, one must avoid the temptation to read into the prior art the teachings of the invention in issue and guard against slipping into the use of hindsight. The prior art itself, and not the applicant’s achievement, must establish the obviousness of the combination.

⁵⁵ I have not been asked to opine on either of the secondary considerations of non-obviousness.

92. An invention is obvious if one of ordinary skill in the art, faced with the wide range of needs created by developments in the field, would have found it obvious to employ the solution tried by the applicant to meet such needs.

93. I understand that, in addition to patents and printed publications, the prior art can also include the conception and reduction to practice of the invention by others in the U.S. before the priority date. I understand that one of the problems in evaluating systems that that was were operational in the past is determining which features were available and operational on which dates. I further understand that an inventor's testimony is insufficient to prove conception or reduction to practice without some form of independent corroboration of that testimony. I understand that mere testimonial evidence by witnesses is not enough to meet the burden of proving invalidity by clear and convincing evidence.

94. Finally, an issued patent is presumed to be valid. In order to demonstrate that a patent is not valid, all issues of fact must be shown by clear and convincing evidence. I understand that Apple's experts—Dr. Kelly, Mr. Kenswil and Mr. Sofocleous—bear the burden of proof on all issues related to validity of the asserted patents.

B. At the time of the invention, selling digital audio signals and digital video signals over telecommunications lines for storage in user-controlled memory was neither obvious nor a predictable variation over the prior art.

95. At the time of the invention (June 13, 1988), content producers were unwilling and/or unable to make their content available for sale (or otherwise make their content available for distribution) in digital format over computer networks. As indicated by the Kenswil report:

Quite simply, record labels had no systems in place to conduct such a business. It took many years and tens of millions of dollars of investment by each major label to build the systems for servicing stores such as iTunes. Indeed, UMG was not ready to do so in an efficient fashion until after 2000. Prior to that time,

although some titles could potentially be offered for sale at any given time, the cost of digitally preparing the millions of previously-released recordings (that existed only in analog form) would have been very high, especially in comparison to the size of the potential consumer base, which I discuss in more detail below.⁵⁶

96. Even as late as 1999, only one of the five major music studios (Sony) had a central digital music archive in place that would allow it to participate in electronic distribution of its digital audio signals:

U.S. record labels are at varying stages in their efforts to achieve a central digital database with asset management and archival preservation functions. Following is a rundown of the status to date.

* Sony Music is the only one of the five major-label groups to have a central digital music archive in place.

Its customized system—which is handled by a staff of 10—is based on the twin concepts of asset preservation and asset management. “It allows us to save our recordings and to quickly find, transfer, and re-purpose them for electronic media distribution and other ventures,” says director of technology Malcolm Davidson.

The system was installed in early 1996 and has been online since. Approximately 40% of Sony Music’s CD-era recordings are now stored in its digital silo, with an estimated 2% of remaining catalog being added every year: Also, all new releases are automatically added to the silo. The material in the digital silo is “backed up” at the close of every day.

The database consists of a Silicon Graphics computer and an EMASS data archive system developed by Raytheon (now Advanced Digital Information Corp.’s AMASS), which includes an Automatic Media Library (AML) component.

The AML is a robotic retrieval system that offers infinitely expandable storage. It can store a variety of media, including Digital Tape Format (DTF), Advanced Intelligent Tape, and Digital Linear Tape.

The company has installed Sony-manufactured DTF subsystems that store data on large (42 gigabyte) or small (12 gigabyte) tape cartridges.⁵⁷

⁵⁶ Kenswil report at ¶ 39.

⁵⁷ BILL BOLLAND, A management/preservation scorecard, BILLBOARD 92 (Nov. 6, 1999) (emphasis added), available online at <http://books.google.com/books?id=eggEAAAAMBAJ&pg=PA92>.

97. As discussed in the quote above, Sony was the only music label that had a central digital music archive system in place by 1999 to “find, transfer, and re-purpose them [recordings] for electronic media distribution,” and Sony used tapes as its storage medium.

98. Additionally, as noted by Mr. Leopold, content producers were unwilling to make MIDI sequences available for digital distribution over bulletin board systems, such as the PAN network:

Not that such collaborations can not [*sic*] be done in a more public manner. Indeed, we have tried to encourage that by giving a triple rebate on the connect time to anyone who contributes original sequences. But, to a much greater degree than the sharing of sounds, people are quite reluctant to share sequence files. And rightly so, since we are dealing here with the raw material of platinum. Such is the nature of the beast.⁵⁸

99. In this quote, Mr. Leopold describes the reluctance of PAN users (musicians) to share sequencer files of notes, MIDI sequences. According to Mr. Leopold, musicians were unwilling to share such sequences because they considered them to be “the raw material of platinum.” The PAN musicians were unwilling to share these sequences even when given a financial incentive (triple rebate on connect time). “Such [wa]s the nature of the beast” at the time.

100. Over and above “raw” sequences of MIDI notes, those of ordinary skill⁵⁹ would regard “digital audio signals” (which include digital sound recordings of musicians performances) to be more valuable than the electronic score in sequencer files—in Mr. Leopold’s terms, more valuable than “platinum.” Thus, contrary to the Kelly report’s suggestions throughout the exhibits, modifying systems that were not designed to accommodate the sale

⁵⁸ *MIDI by Modem* at 5 (N2K002625).

⁵⁹ As in the exhibits, I use the terms “those of ordinary skill” and “one of ordinary skill” to refer to those of ordinary skill in the art at the time of the invention, in June 13, 1988.

and/or distribution of digital audio signals and digital video signals to accommodate such sales and/or distribution would not have been a predictable or obvious variation.

101. Content producers believed the digital formats of their content—such as digital audio signals and digital video signals—were so valuable that they were unwilling to make systems that stored them accessible to users on devices that were in the control and possession of the users. Instead, at the time of the invention, content producers were focused on utilizing techniques to avoid storage to consumer-controlled memory. The audio and video recording labels attempted to block electronic distribution of recordings during the 1990s and into the next decade due to concern over loss of their control of the audio and video markets.

102. As one example, the Freeny patent described a system in which even though the information was transmitted over a telecommunications line, the information would only be transmitted to a retail location so that a physical object, such as a CD or cassette could be made and sold on-the-spot to a customer:

The present invention provides a means for reproducing or manufacturing material objects at point of sale locations only with the permission of the owner of the information, thereby assuring that the owner of the information will be compensated in connection with such reproduction. The system of the present invention solves the problems associated with manufacturing, inventory, configuration distribution and collection previously discussed and permits sale of material objects embodying information in a more efficient, economical and profitable manner.⁶⁰

103. Thus, the Freeny patent accommodated concerns of content providers, later outlined by Mr. Leopold. First, the Freeny system maintained control over the digital audio signals and digital video signals by transmitting them to a retail location, not to user-controlled

⁶⁰ Freeny at 4:8–18.

memory. Second, the Freeny system maintained control over the digital audio signals and video signals by only selling them in material objects, such as cassette tapes.⁶¹

104. As another example, the Elkins patent discloses using digital storage for temporary storage which was not in the control of the user and could only be accessed through a telephone:

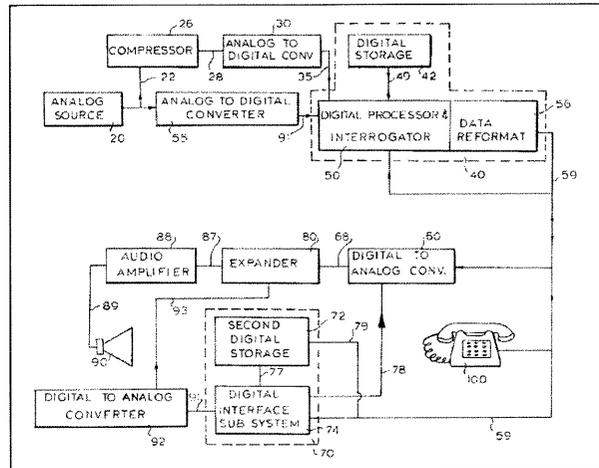
A command signal generator 100 is coupled to the communications circuit 59. In the case where the communications circuit 50 comprises a typical 3 KHz bandwidth telephone line, the command signal generator 100 may comprise the TOUCHTONE telephone connected to this line and used for normal voice communications. The digital interrogator 50 as well as the digital interface subsystem 74 both contain command circuitry for responding to the tone command signals generated by the telephone. In this manner, codes may be designated for selecting the desired digital signals from the digital storage subsystem 42 or the second digital storage subsystem 72 by the operation of the command signal generator 100. In the case of wide band communications lines 59, the command generator 100 may comprise a digital command formatting for generating an inneractive [*sic*] digital signal for actuating the digital interrogator 50 or the digital interface subsystem 74. Of course, the TOUCHTONE type command system could also be used on the wide band communications lines.⁶²

⁶¹ Freeny at 4:36–55:

The term “material object” as used herein means a medium or device in which information can be embodied or fixed and from which the information embodied therein can be perceived, reproduced, used or otherwise communicated, either directly or with the aid of another machine or device. For example, a cassette tape is a material object in which information (sounds of an artist's performances of musical compositions) can be embodied or fixed and, using the cassette tape with the aid of cassette player, the information can be communicated or heard. By way of another example, a floppy disk is a material object in which information in the form of programs can be fixed and the program so embodied in the floppy disk can be used with a machine or computer adapted to accept the floppy disk input and use the program (information) embodied therein. Other examples of material objects include phonograph records, 8-track tapes, reel-to-reel tapes, video discs, handheld calculators, handheld electronic games, greeting cards, maps and sheet music.

⁶² Elkins at 5:56–6:7.

105. Similar to the control mechanisms in Freeny, the Elkins distributor controlled access to the digital storage 72, making it only available to the user through her telephone 100 and only through calling the distributor's digital interrogator 50:⁶³



106. As explained in the Elkins patent:

In this manner, the digital interface subsystem 74 may act as a modem for reformatting the digital signals so as to be compatible with the format required by the digital to analog converter 60. If an asynchronous modem is used as the digital interface subsystem 74, the second digital storage subsystem 72 may be utilized as a buffer storage device for accumulating the digital data signals prior to their processing by the digital interface subsystem 74. Also, the second digital storage subsystem 72 may comprise large capacity storage devices similar to those described for the digital storage subsystem 42, thereby enabling the storage of digital program material at the remote user location. These digital programs may be retrieved by the digital interface subsystem 74 in a manner similar to the operation of the digital interrogator 50 as previously explained.⁶⁴

107. Thus, the Elkins patent kept the second digital storage in the distributor's control: the user had to use her phone to call digital interrogator 50 to activate the modem 74 to retrieve information from the second digital storage.

⁶³ Elkins at Figure.

⁶⁴ Elkins at 5:12-27.

108. Selling digital audio signals and digital video signals over telecommunications lines and storing them in user-controlled memory, including hard drives and hard disks, were not obvious or predictable variations over the prior art, based on the state of prior art at the time. If one of ordinary skill in the art had realized the significant advantages of such a system, they would have published, patented, and/or built such a system. The financial gain was too high to ignore for one who realized the potential of the system described in the asserted patents.

C. PAN network

109. The Kelly report contends that the Performing Arts Network (PAN) system anticipates or renders obvious all of the asserted claims. The Kelly report's analysis relies heavily on the deposition testimony of Mr. Leopold while also citing a paper written by Mr. Leopold and an article written by Simon Lloyd. The Lloyd article, *Getting into PAN*, did not include a date.⁶⁵ The Leopold paper (N2K002621–26), *MIDI by Modem*, also did not include a date. I also reviewed Apple's responses to SightSound's Interrogatories 11 and 12, which did not provide any further information regarding the dates of these papers.

110. While Mr. Lloyd's article was not specifically dated, the article could not have been published before April 1989 because the article includes log files that are dated April 10, 1989.⁶⁶ Thus, the Lloyd article cannot be relied upon in an invalidity analysis because the Lloyd article is not prior art and may include discussion of features and operation of the PAN system that were not available on June 13, 1988.

111. I further understand that the Lloyd article cannot be used to corroborate Mr. Leopold's testimony because of its date. Because the Lloyd article post-dates the priority date of

⁶⁵ Simon Lloyd, *Getting into PAN*, SONICS (N2K002617).

⁶⁶ N2K002620.

the asserted patents, June 13, 1988, there is no independent evidence that would corroborate Mr. Leopold's testimony.

112. I further note that both articles, *MIDI by Modem* and *Getting into PAN*, were made available to the Patent Office for its review during the reexamination of the asserted patents. The Patent Office considered both articles in their evaluation of the asserted claims' validity. This is evidenced by the fact that the examiner's initials were placed next to these references, indicating that the reference had been reviewed and considered.⁶⁷ During reexamination, the Patent Office did not issue a single rejection based on either article. All of the asserted claims were found to be valid after reexamination.

113. It is my opinion that the PAN system does not invalidate any of the asserted claims even assuming (1) that Mr. Lloyd's article, *Getting into PAN*, is prior art and (2) that Mr. Leopold's testimony and article are accurate descriptions of the PAN system as of June 13, 1988. My analysis and comparison of the PAN system with the asserted claims is included in Exhibits D and E.

D. U.S. Patent No. 4,999,806 (Chernow)

114. U.S. Patent No. 4,999,806 (Chernow) issued on March 12, 1991, from an application filed on September 4, 1987. The Chernow patent is directed to a software distribution system.

115. Like the two PAN articles, Chernow was made available to the Patent Office for its review during the reexamination of the asserted patents. The Patent Office considered the Chernow patent in its evaluation of the asserted claims' validity. This is evidenced by the fact that the examiner's initials were placed next to the Chernow patent (Tab no. 7), indicating that

⁶⁷ List of references cited by applicant and considered by examiner (Oct. 26, 2005).

the reference had been reviewed and considered.⁶⁸ During reexamination, the Patent Office did not issue a single rejection based on the Chernow patent. All of the asserted claims were found to be valid after reexamination.

116. It is my opinion that the Chernow patent does not anticipate and does not render obvious (alone or in combination) any of the asserted claims. My analysis and comparison of the Chernow patent with the asserted claims is included in Exhibits F and G.

E. JP S60-253082 (Mabe)

117. Japanese Unexamined Patent Application No. S60-253082 (Mabe) (APPLE0031199) bears a publication date of December 13, 1985. I have not been able to confirm whether Mabe was, in fact, published on that date.

118. The Mabe reference discloses a music information distribution system that made a strategic choice of file formats—encoded sheet music notation—that would allow for faster-than-real-time transmission. It is my opinion that Mabe does not anticipate and does not render obvious (alone or in combination) any of the asserted claims. My analysis and comparison of the Mabe reference with the asserted claims is included in Exhibits H and I.

F. The Ball system

119. The Kelly report asserts that the Ball system or Ball invention was prior art to the asserted patents. It is unclear which portion of the previous-35 U.S.C. § 102 is the basis for the Kelly report's assertion that the Ball system was prior art.

120. The Kelly report's relies on three patent applications as evidence that the Ball system existed: (1) Canadian Patent Application No. 547,854; (2) U.S. Provisional Patent Application 60/150,760 and (3) European Patent Application No. 0 309 298. I understand that

⁶⁸ List of references cited by applicant and considered by examiner (Oct. 26, 2005).

none of these applications issued as patents and that all of the applications were abandoned. It is my understanding that an abandoned application can at best serve as evidence of a conception. Without additional evidence, I understand that it would be improper to conclude that any invention disclosed in an abandoned application demonstrates that an invention was reduced to practice.

121. The Kelly report contains no facts or analysis related to whether the purported Ball system with necessary “Optional Features” was ever reduced to practice. There is not enough evidence to conclude that this purported Ball system was ever reduced to practice; therefore, the purported Ball system cannot be considered prior art.

122. I also conclude that the purported Ball system, as described in the applications, would not have anticipated or rendered obvious (alone or in combination) any of the asserted claims even if it could be considered prior art. My comparison of the purported Ball system with the asserted claims is included in Exhibits J and K.

G. The Ball U.S. application

123. The Kelly report also argues that the Ball U.S. application was prior art to the asserted patents. It is unclear which portion of the previous-35 U.S.C. § 102 is the basis for the Kelly report’s assertion that the Ball U.S. application is prior art.

124. It is my understanding that the Ball U.S. application never issued as a patent and that the Ball U.S. application is an abandoned application. It is my understanding that an abandoned application can at best serve as evidence of a conception. Without additional evidence, I understand that it would be improper to treat an unpublished and abandoned application as prior art.

125. The Kelly report contains no facts or analysis related to whether the purported Ball system with necessary “Optional Features” was ever reduced to practice. Thus, it is my opinion that the Ball U.S. application cannot be considered prior art.

126. I also conclude that the purported Ball U.S. application would not have anticipated or rendered obvious (alone or in combination) any of the asserted claims even if it could be considered prior art. My analysis and comparison of the purported Ball U.S. application with the asserted claims is included in Exhibits L and M.

H. The Lakhani European application

127. European Patent Application EP 0,309,298 (the “Lakhani European application”) was published on March 29, 1989. The application lists Grant Ball, Abdul Lakhani and Karim Lakhani as the named inventors.

128. As discussed above, the asserted claims are entitled to a priority date of June 13, 1988. Given that the Lakhani European application’s publication post-dates the priority of the ’440 patent, it is my opinion that the Lakhani European application is not prior art.

129. I also conclude that the purported Lakhani European application would not have anticipated or rendered obvious (alone or in combination) any of the asserted claims even if it could be considered prior art. My analysis and comparison of the Lakhani European application with the asserted claims is included in Exhibit N.

I. U.S. Patent No. 4,506,387 (Walter) in combination U.S. Patent No. 4,878,245 (Bradley)

130. U.S. Patent No. 4,506,387 (“Walter” or the “Walter patent”) issued on March 19, 1985, from an application filed on May 25, 1983. The only inventor listed on the face of the patent is Howard Walter. The Walter patent is directed to programming-on-demand cable systems.

131. The Walter patent was made available to the Patent Office for its review during the reexamination of the asserted patents. The Patent Office considered the Walter patent in its evaluation of the asserted claims' validity both in the original prosecution of the '440 patent and during reexamination. The Walter patent was submitted to the Patent Office for its review by the patentee. In addition, the examiner initialed the form next to the Walter patent (tab no. 24), indicating that the Walter patent was also reviewed and considered during reexamination.⁶⁹ During reexamination, the Patent Office did not issue a single rejection based the Walter patent. All of the asserted claims were found to be valid after reexamination.

132. U.S. Patent No. 4,878,245 ("Bradley" or the "Bradley patent") issued on Oct. 31, 1989 from an application filed on January 22, 1987. The Bradley patent identifies Graham Bradley, Alton Stretten, John Stretten and Rex Wentzel as named inventors. The Bradley patent is directed to control and metering systems for pay television.

133. I conclude that the combination of the Walter patent and the Bradley patent would not have anticipated or rendered obvious (alone or in combination) any of the asserted claims. My analysis and comparison of the combination of the Walter and Bradley patents with the asserted claims is included in Exhibits O and P.

J. U.S. Patent No. 5,132,992 (Yurt)

134. U.S. Patent No. 5,132,992 ("Yurt" or the "Yurt patent") issued on July 21, 1992, from an application filed on January 7, 1991. The Yurt patent identifies Paul Yurt and H. Lee Browne as named inventors. The Yurt patent is directed to an audio and video transmission system.

⁶⁹ List of references cited by applicant and considered by examiner (Oct. 26, 2005).

135. The Yurt patent was considered by the Patent Office and both of the reexamination examiners, and was the subject of discussion between the patentee and the Patent Office. All of the asserted claims were found to be valid after reexamination.

136. Furthermore, the Yurt patent was based on an application filed after June 13, 1988. Thus, it is my opinion that the Yurt patent is not prior art to the '440 patent under 35 U.S.C. §§ 102(b) and 102(e).

137. I conclude that the Yurt patent would not have anticipated or rendered obvious (alone or in combination) any of the asserted claims even if it could be considered prior art. My analysis and comparison of the Yurt patent with the asserted claims is included in Exhibit Q.

VIII. Double Patenting

138. The Sofocleous report concludes that there remains a “critical open question” as to whether the asserted claims of the '440 patent are patentably distinct from claims 3 and 6 of the '573 patent and claim 3 of the '734 patent.⁷⁰ The Sofocleous report’s conclusion is wrong, effectively engaging in “mind-reading” in an attempt to analyze why the examiners and the Patent Office did what they did during reexamination. In performing this “mind-reading,” the Sofocleous report ignores the actual prosecution history and reexamination history.

139. First, the patentee expressly asked the Patent Office to consider any questions regarding double patenting during the original prosecution of the '440 patent, and the Patent Office did not reject any of the claims for double-patenting.

140. Second, during reexamination of the '440 patent, even though double-patenting issues were squarely considered by the Patent Office, the Patent Office ultimately withdrew all rejections of claims 1, 64 and 95 of the '440 patent based on double patenting.

⁷⁰ Sofocleous report at ¶¶ 109, 133.

141. Third, the Kelly report concludes that the asserted claims of the '440 patent are invalid for double patenting in light of claims 3 and 6 of the '573 patent and/or claim 3 of the '734 patent. The Kelly report's conclusion is incorrect because it ignores that the claims of the '440 patent are directed to different parties and ignores this Court's construction of the term "charging a fee." Claims 1, 64 and 95 of the '440 patent are not invalid for double-patenting because claims 3 and 6 of the '573 patent and claim 3 of the '734 patent only include steps for "providing payment" and do not disclose "requesting payment." The Kelly report provides no additional information from which to conclude that the additional steps recited by claims 1, 64 and 95 are obvious.

A. Legal Standard

142. As I understand, obviousness-type double patenting prohibits issuance of a subsequent patent with claims that are identical to or obvious variations of claims in an earlier patent, where the two have a common inventor or the same owner.

143. I am aware that the analytical approach for obviousness-type double patenting is similar to that under 35 U.S.C. § 103. However, the scope of a double patenting inquiry is limited to only the claims of the first patent, rather than the entirety of its disclosure. In other words, I understand it to be a claim-by-claim comparison or analysis.

144. In making this claim-by-claim comparison for an obviousness-type double patenting analysis, a determination of the differences between the scope and content of the patent claims at issue is made from the perspective of a person of ordinary skill in the art. Any objective criteria suggesting non-obviousness can also be considered.

145. I understand that the patent specification may be consulted to help define the scope and content of any unconstrued claim terms, but that it cannot be used as the basis for rendering obvious a later filed claim in a double patenting analysis.

146. I am also aware that a claim of a later patent is not invalid for obviousness-type double patenting over the claims of an earlier patent if the claims of the later patent are patentably distinct and separable from the claims of the earlier patent. A later filed claim may be patentably distinct if earlier claims are broader or recite elements more generically than the claims of the later patent, or if the claims at issue are directed at distinct and separable functions of a system. Furthermore, I have been informed that a machine claimed in an earlier patent that must be modified in some respects to practice a method claimed in a later patent can support the non-obviousness of the later claims.

B. Prosecution History Related To Double Patenting

147. I have examined the prosecution history of the '440 patent with respect to the issue of obviousness-type double patenting, including the *Ex Parte* Reexamination history.

148. The following are relevant events from the original prosecution of the '440 patent application related to the issue of double patenting:

- On July 3, 1996, the applicant *sua sponte* requested the Examiner to review the pending claims of the '440 patent for double patenting over the '573 patent and '734 patent.⁷¹
- The Examiner subsequently issued a number of Office Actions rejecting the pending claims, but never on the ground of obviousness-type double patenting.

⁷¹ See '440 prosecution history, Amendment at 57 (Jul. 3, 1996) ("Applicant reminds the Examiner of related continuation application 08/607,648 and asks the Examiner to review whether there is any double patenting issue with regard to this application 08/607,648 [('743 patent)] or parent patent, U.S. Patent No. 5,191,573.") (SST-005435 at SST-005491).

This included Office Actions from October 9, 1996 (rejection pursuant to 35 U.S.C. § 103 in light of US Patent No. 4,528,643 (Freeny)) and July 10, 1997 (same).

- The Examiner ultimately entered a final Notice of Allowability on August 26, 1999.

149. Despite the Applicant's request to review double patenting issues in light of the '734 and '573 patents, the Examiner found no such issue. The Examiner had several opportunities to make a double-patenting rejection for over three years—i.e., from July 3, 1996 (Applicant's initial request to review the claims of the '440 patent application for double patenting issues) to August 26, 1999 (Notice of Allowability)—but never did so.

150. *Ex Parte* Reexamination of the '440 patent was instituted on January 31, 2005. The reexamination petition raised anticipation and obviousness arguments in view of various prior art references. Additionally, the petition included double patenting arguments in view of the '734 and '573 patents, despite being explicitly raised during the original prosecution of the '440 patent.⁷²

151. In fact, in granting the *Ex Parte* Reexamination Request, the Examiner only found a substantial new question of patentability based on two new prior art references, U.S. Patent No. 4,449,568 (Gremillet) and GB 2,178,275 (Gallagher), and a subsequent reversal of claim construction on the Freeny patent.⁷³ In other words, the requester's double patenting arguments did not appear to amount to a new issue on patentability.

152. Moreover, the first Office Action on June 21, 2005—just three months after the grant of the *Ex Parte* Reexamination Request—rejected the claims of the '440 patent only on

⁷² See '440 Reexamination History, 1/31/2005 *Ex Parte* Reexamination Request.

⁷³ See '440 Reexamination History, 3/18/2005 Order Granting Request for *Ex Parte* Reexamination at 2–3.

anticipation (35 U.S.C. § 102) and obviousness (35 U.S.C. § 103) grounds, *e.g.*, U.S. Patent No. 4,449,568 (Gremillet) (§ 102) and GB 2,178,275 (Gallagher) in view of Freeny (§ 103).⁷⁴ The Examiner made no mention of double patenting here.

153. It was not until October 26, 2005 that a double patenting objection first appeared in the reexamination proceedings.⁷⁵ Here, claims 1, 4–21, 23–36, 39, 40, 42, 45–61 were rejected under obviousness-type double patenting as being unpatentable over claims 1–34 of the '734 patent and also separately over claims 1–6 of the '573 patent.⁷⁶

154. The Patentee responded on December 27, 2005 and again on February 26, 2006. In its responses, I understand the Patentee argued that the double patenting rejections were improper for essentially four reasons: (1) double patenting did not present a substantial new issue of patentability because the issue was raised to, and in front of, the original examiner during prosecution of the '440 patent application; (2) obviousness-type double patenting rejections unsupported by some suggestion in the prior art or knowledge of skill in the art is improper; (3) patent disclosures may not be used as prior art in a double patenting rejection; and (4) the Examiner was inconsistent in its application of prior art under § 103(a) and double patenting.⁷⁷

155. On March 27, 2006, the Examiner, in response to the patentee's double patenting remarks, indicated (in a Final Office Action) for the first time that a substantial new question of patentability existed with the double patenting issue because the applications were co-pending

⁷⁴ See '440 Reexamination History, 6/21/2005 Office Action at 2–21.

⁷⁵ See '440 Reexamination History, 10/26/2005 Office Action at 4–7.

⁷⁶ *Id.*

⁷⁷ See '440 Reexamination History, 12/27/2005 Remarks at 27–35; *id.*, 2/26/2006 at 8–16.

during the original prosecution of the '440 patent.⁷⁸ It would have been impossible to know at what state the original Examiner considered the earlier claims for a potential double patenting rejection.⁷⁹ Essentially, the earlier claims could have been at various stages of amendments when the applicant requested the original Examiner review the '440 application for double patenting issues.

156. It is notable, however, that the '573 patent had already issued on March 2, 1993 when the Applicant first made its request to the Examiner to review the '440 claims for double patenting issues on July 3, 1996. Moreover, the '734 patent claims were amended just once, on December 9, 1996, after the same double patenting request was made to the Examiner and ultimately allowed on February 5, 1997, just seven months after that same request.⁸⁰ In fact, when the claims of the '734 patent were allowed on February 5, 1997, the Final Office Action during the original prosecution of the '440 patent was still months away from issuance, *i.e.*, July 10, 1997. In other words, if a double patenting objection truly had merit in the view of the original Examiner of the '440 patent application, it could have properly been included in that office action as the '734 and '573 patent claims were in their final allowable form.

157. On May 15, 2006, the (reexamination) Examiner *sua sponte* vacated the Final Office Action from March 27, 2006. But, on September 29, 2006, the very same double patenting rejections were subsequently revived in a Non-final Office Action.⁸¹

⁷⁸ See '440 Reexamination History, 3/27/2006 Final Office Action at 3 (“the corresponding claims could have been at various stages of amendments. Therefore, it is impossible to determine at what state the Examiner considered the claims for a potential double patenting rejection and therefore a substantial new question of patentability exists.”).

⁷⁹ See '440 Reexamination History, 3/27/2006 Final Office Action at 3 (“the corresponding claims could have been at various stages of amendments. Therefore, it is impossible to determine at what state the Examiner considered the claims for a potential double patenting rejection and therefore a substantial new question of patentability exists.”).

⁸⁰ See '734 Prosecution History, 12/9/1996 Amendment; *id.*, 2/5/1997 Notice of Allowability.

⁸¹ See '440 Reexamination History, 9/29/2006 Office Action at 42–44, 66–71.

158. On November 29, 2006, the Patentee responded to the double patenting rejection yet again arguing, among other things, that a double patenting rejection that was already considered during the original prosecution of the '440 patent application was improper.⁸² The Examiner, in a Final Office Action, avoided the direct issue of whether the double-patenting rejection in this context constituted a new question of patentability, and instead declared double patenting rejections appropriate during reexamination proceedings as a general matter so long as some ground existed supporting a new question of patentability, whether related or not.⁸³

159. The Patentee responded to this Office Action and again argued that double patenting rejections were improper under the same theories from its November 29, 2006 Response—e.g., double patenting was previously considered during the original prosecution of the '440 patent and an obviousness-type double patenting rejection is improper if made over a related patent alone without citation to prior art or general knowledge of one of skill in the art.⁸⁴

160. On July 30, 2007, following a Notice of Appeal from May 31, 2007, the Patentee filed an Appeal Brief to the Board of Patent Appeals and Interferences (BPAI). The Appeal Brief highlighted many of the same arguments throughout the reexamination proceedings related to the double patenting issue—e.g., double patenting was previously considered during the original prosecution of the '440 patent, an obviousness-type double patenting rejection is improper if made over a related patent alone without citation to prior art or general knowledge of one of skill in the art, and, since the '573 and '734 patent claims were the subject of a concurrent reexamination, a double patenting rejection over their claims as they existed prior to the reexamination was improper.⁸⁵

⁸² See '440 Reexamination History, 11/29/2006 Remarks at 32–33.

⁸³ See '440 Reexamination History, 3/17/2007 Final Office Action at 60–61.

⁸⁴ See '440 Reexamination History, 5/17/2007 Remarks at 25.

⁸⁵ See '440 Reexamination History, 6/30/2007 Appeal Brief at 76–81.

161. The Examiner filed a Responsive Brief on April 24, 2008, and simply noted that “[t]he original prosecution history fail[ed] to show that instant double patenting rejection was addressed.”⁸⁶ The Examiner further suggested that the original Examiner failed to deem the double patenting issue as moot.⁸⁷

162. During the hearing before the BPAI on June 19, 2009, the Examiner admitted that “[the double patenting rejections] were not a significant leg of the rejection” and were made as “an opportunity to [clearly apply double patenting rejections to the issued claims]” since, to the Examiner, it was “not clear whether the [original] Examiner evaluated the issued claims in regard to double-patenting.”⁸⁸

163. The BPAI ultimately determined the double patenting rejections during reexamination to have been in error because the ’573 and ’734 patents were the subject of reexamination and could not have formed the basis of a double patenting rejection based on their claims as they existed prior to the reexamination.⁸⁹

164. On March 2, 2010, the Examiner issued a Notice of Intent to Issue an *Ex Parte* Reexamination Certificate for the reasons outlined by the BPAI.⁹⁰

165. The foregoing supports my conclusion that the claims are not invalid for double patenting. Given that the PTO rejected such arguments on multiple occasions, it is not surprising that neither the Kelly report nor the Sofocelous report has shown invalidity because of obviousness-type double patenting by clear and convincing evidence.

⁸⁶ 4/24/2008 Office Action at 86.

⁸⁷ 4/24/2008 Office Action at 86.

⁸⁸ See ’440 Reexamination History, 6/19/2009 Record of Oral Hearing Before the BPAI at 13:7–20.

⁸⁹ See ’440 Reexamination History, 11/3/2009 BPAI Decision on Appeal at 18–19.

⁹⁰ See ’440 Reexamination History, 3/2/2010 Notice of Intent to Issue *Ex Parte* Reexamination Certificate at 2–3.

C. **Double Patenting Analysis**

166. I understand that the Kelly report suggests that claims 1, 64, and 95 of the '440 patent are invalid due to obviousness-type double patenting. In this regard, I have analyzed the Kelly report as well as Exhibits R and S. I disagree with the Kelly report's analyses and conclusions regarding double patenting.

1. **The steps of charging a fee and charging an account are patentable variations over claims 3 and 6 of the '573 patent and claim 3 of the '734 patent.**

167. Claims 1, 64 and 95 of the '440 patent are directed to specific elements in the sale of digital audio or digital video signals as performed by a particular party—e.g., selling electronically and charging a fee/account. Claim 1 of the '440 patent requires a step of “selling electronically” which includes the “step of charging a fee via a telecommunications line by the first party,” which includes the step of “charging the account of the second party”:

the step of selling electronically includes the step of charging a fee via telecommunications lines by the first party to the second party at a first party location remote from the second party location, the second party has an account and the step of charging a fee includes the step of charging the account of the second party

Claim 64 of the '440 patent includes the very same limitation. And, claim 95 of the '440 patent similarly includes the same requirements:

Charging a fee by the first party . . . the step of charging a fee includes the step of charging a fee via telecommunications lines by the first party to the second party at a location remote from the second party location, the second party has an account and the step of charging a fee includes the step of charging the account of the second party

168. The Kelly report reached the wrong conclusion regarding double-patenting because the “charging a fee,” “having an account” and “charging an account” limitations are

different in scope and patentable variations from claims 3 and 6 of the '573 patent or claim 3 of the '734 patent.

169. The Kelly report's ignored this Court's claim construction in analyzing double patenting. This Court construed "charging a fee" to mean "requesting payment electronically." In contrast, this Court construed "transferring money electronically" to mean "providing payment electronically (i.e., through devices or systems which depend on the flow of electrons)." In reaching its construction of "transferring money electronically," this Court adopted and favorably received the *N2K* court's claim construction ruling:

The undersigned has reviewed the construction of these terms in the prior R&R, and finds the analysis therein to be thorough, instructive and in accord with the intrinsic evidence. *Sightsound.com*, 185 F.Supp.2d at 472-74. The parties having shown no intervening caselaw, new evidence or new arguments that impact the viability of Magistrate Judge Benson's prior constructions, the undersigned recommends the constructions set forth below.⁹¹

170. I understand that in its analysis of "transferring money electronically," the *N2K* court described the requirement of providing a credit card number in claims 3 and 6 of the '573 patent as one way a user could provide payment electronically.⁹²

171. Against that backdrop, there is a clear and meaningful difference between claims 3 and 6 of the '573 patent and the "charging a fee" limitations of the '440 patent. As an initial matter, claims 3 and 6 of the '573 patent recite actions that are performed by the second party, while the limitations at issue in the '440 patent must be performed by the first party.

⁹¹ Special Master's report & recommendation regarding claim construction at 28 (ECF #142).

⁹² 185 F. Supp. 2d at 473 ("The fact that the '573 patent employs 'transferring money electronically' as a general term, and includes within that term the concept of providing a credit card number and authorization, establishes clearly that the methods of providing payment electronically over a telecommunications line include but are not limited to providing authorization to charge a credit card account.").

172. The plain language of claims 3 and 6 requires that the second party telephone the first party and provide to the first party a credit card number in order for the second party to be charged money. On the other hand, claims 1, 64 and 95 of the '440 patent require action by the first party: charging a fee via telecommunications lines by the first party. Similarly, the second party having an account, in the context of “charging a fee . . . by the first party” would convey that the second party has an account with the first party so that when the first party charges a fee, the first party is also “charging the account of the second party.”

173. That the first party is the actor for these limitations of the '440 patent is further emphasized by another requirement of claims 1, 64 and 95: “selling electronically by the first party.”

174. Furthermore, claims 3 and 6 of the '573 patent require “providing a credit card number of the second party controlling the second memory to the first party controlling the first memory so the second party is charged money.” Based on the *N2K* court’s analysis for “transferring money electronically”—which was adopted by this Court—“providing a credit card number of the second party . . .” is one way of providing payment electronically. (*See* ¶ 10, *supra*; 185 F. Supp. 2d at 473.) In contrast, there is nothing in claims 3 and 6 of the '573 patent that demonstrate requesting payment electronically (*i.e.*, “charging a fee”) as required in claims 1, 64 and 95 of the '440 patent. Similarly, while a second party might have a “credit card account,” that is not a disclosure of having an account with the first party, which is implicated by claims 1, 64 and 95 of the '440 patent.

175. The Kelly report is silent as to the difference in scope and construction between providing and requesting payment. In fact, the specific double patenting analysis in the Kelly

report mentions nothing of this Court’s claim construction order.⁹³ Rather than acknowledge the clear difference in claim scope as supported by this Court’s claim construction order, the analysis in the Kelly report improperly equates the two distinct requirements found in the ’573 and ’440 patents. It does so by comparing the claim language of the ’573 patent to the ’440 patent and interpreting isolated statements from the ’573 prosecution history.⁹⁴

176. The statements from the prosecution history of the ’573 patent relied upon in the Kelly report do not support the Kelly report’s conclusion. More specifically, the fact that an electronic sale “assumes a transferring of money by providing a credit card” does not suggest that such a sale is limited to that act. The language of claims 1, 64 and 95 of the ’440 patent demonstrates that an electronic sale also includes, for instance, requesting payment (i.e., charging a fee) by a first party. In other words, while claims 3 and 6 of the ’573 patent are directed toward providing payment and providing credit card information by the second party, the claims of the ’440 patent claims are focused on a wholly distinct part of an electronic sale. This difference is a fundamental and non-obvious variation between claims 3 and 6 of the ’573 patent and claim 1, 64 and 95 of the ’440 patent.

177. My analysis and conclusion above remain the same even in view of claim 3 of the ’734 patent because claim 3 of the ’734 patent includes the same language discussed above:

Claims 3 and 6 of the ’573 patent	Claim 3 of the ’734 patent
telephoning the first party controlling use of the first memory by the second party;	telephoning the first party controlling use of the first memory by the second party
providing a credit card number of the second party controlling the second memory to the first party controlling the first memory so the second party is charged money	providing a credit card number of the second party controlling the second memory to the first party controlling the first memory so the second party is charged money

⁹³ See generally Kelly report at ¶¶ 214, 216, Ex. R at 4, 10–11, 13–14; *id.*, Ex. S at 2–3, 7, 10–11.

⁹⁴ See Kelly report at Ex. R at 4, 10, 13–14, Ex. S at 3, 7–8, 11.)

178. In fact, the Kelly report advances the same basic arguments in light of the '734 patent to conclude that the "charging a fee/ selling electronically" limitations in the '440 patent are invalid for obviousness-type double patenting: (1) that claim 3 of the '734 patent recites the step of "telephoning the first party controlling use of the first memory by the second party"; (2) claim 3 recites the step of "providing a credit card number of the second party controlling the second memory to the first party controlling the first memory so the second party is charged money"; (3) that one of skill in the art would know that an electronic transferring of money is equivalent in scope and function to electronic sales; and (4) that an account is a credit card number.

179. Thus, for the same reasons explained above with respect to the '573 patent, claims 1, 64, and 95 of the '440 patent are patentably distinct variations of claim 3 of the '734 patent.

2. The step of playing in claims 1, 64 and 95 of the '440 patent is a patentable variation over claim 3 and 6 of the '573 patent

180. Claims 1, 64 and 95 of the '440 patent also require playing the digital signals.

Claim 1 of the '440 patent requires:

playing through speakers of the second party control unit the digital video or digital audio signals stored in the second party control unit connected with the second memory of the second party

181. Claim 64 of the '440 patent includes a similar requirement, but further defines the storage medium in the second party control unit as a "second party hard disk":

playing through speakers of the second party control unit the digital video or digital audio signals stored in the second party hard disk, said speakers of the second party control unit connected with the second memory of the second party control unit

Likewise, claim 95 of the '440 patent includes a similar requirement:

playing the digital video or digital audio signals in the second party hard disk with the second party control unit.

182. Contrary to the opinions in the Kelly report, these limitations are not invalid for obviousness-type double patenting over claims 3 and 6 of the '573 patent.⁹⁵

183. The Kelly report does not (and cannot) identify any claims in the '573 patent that require the step of playing the transmitted digital audio or video signal, let alone playing through speakers. Instead, the Kelly report argues that “each of claims 3 and 6 of the '573 patent discloses ‘storing the digital signal in the second memory’” and, from there, concludes that a person of skill in the art would be motivated to perform the step of playing through speakers of the second party.⁹⁶ Beyond this bare conclusion, the Kelly report provides no real evidence that those of ordinary skill in the art would understand or be motivated to include this additional step with claims 3 and 6 of the '573 patent.

184. I further note that there is a tension between the Kelly report’s conclusion that “it would have been obvious for one of ordinary skill in the art to play the digital audio or digital video using [a] general purpose computer” and Apple’s position during claim construction.⁹⁷ During claim construction, Apple argued that several claims of the '440 patent were indefinite for failing to disclose an algorithm.⁹⁸ I am informed that a specification only needs to disclose an algorithm for a means-plus-function claim for those functions that cannot be achieved by any general purpose computer without special programming. Thus, there is a tension between Apple’s position during claim construction—where Apple argued that playing digital audio and digital video signals required a disclosure of special programming—and the Kelly report’s conclusion that it would be obvious to those of ordinary skill in the art to play digital audio and video signals using a general purpose computer.

⁹⁵ See Kelly report at ¶¶ 214, 216, Ex. R at 4, 11, 15.

⁹⁶ Kelly report, Ex. R at 7.

⁹⁷ *Id.*

⁹⁸ Apple’s Opening Claim Construction Br. at 41–42 (ECF No. 91).

185. Claims 3 and 6 of the '573 patent do not provide a starting point or suggestion for the structural components necessary for playing a digital audio or video signal as claimed in the '440 patent. In fact, there is no requirement in the '573 patent that requires that the second party do anything further with the digital video or digital audio signals once they are stored in the second memory.

186. Claims 1 and 64 of the '440 patent are appreciable variations in the configuration of component to play digital audio or video signals. For instance, claim 1 requires a connection between the second memory and the speakers, while claim 64 requires a hard disk with the desired digital signals along with the same type of connection between the second memory and speakers. Neither of these playback configurations are within the scope of claims 3 and 6 of the '573 patent.

187. To compensate for the clear deficiencies in the '573 patent, the Kelly report appears to rely upon the prosecution history of the '440 patent and prior art references to locate and add the missing “playing” step to claim 3 and 6 of the '573 patent. It is my understanding that this is an improper departure from the claim-to-claim comparison required in an obviousness-type double patenting analysis.

188. Nevertheless, the '440 prosecution history does not inform how a person of ordinary skill in the art, looking at claims 3 and 6 of the '573 patent, would accomplish the playing of transmitted digital signals. To the contrary, the Examiner's initial rejection regarding the playing limitations as being an obvious variation of the Freeny system was withdrawn after the applicant's response and appeal that led to the issuance of the '440 patent.⁹⁹ As discussed during the prosecution history upon which the Kelly report relies, the Freeny system was

⁹⁹ See '440 Prosecution History, 1/13/1998 Response and Remarks at 2, 5-7; *id.*, 1/9/1998 Brief on Appeal; *id.*, 9/15/1998 Notice of Allowance.

directed to manufacturing and reproducing information in material objects at a point of sale location and taught away from playing through speakers digital audio or video.¹⁰⁰ In other words, a person of ordinary skill in the art would not have obviously adapted claims 3 and 6 to play the digital audio and video signals based on the teachings of the Freeny system.

189. The Kelly report's reliance on the Chernow patent, Hamilton patent, Mabe reference and Walter patent, which all disclose different components and ways to play or execute digital data, are likewise well beyond the claims of the '573 patent. If anything, those references indicate to a person of ordinary skill in the art that there is a significant difference in scope between claims 3 and 6 of the '573 patent, which reveal nothing about playing, and claims 1, 64 and 95 of the '440 patent.¹⁰¹

190. Moreover, a person of ordinary skill in the art would not look to the Chernow patent, Walter patent, Hamilton patent or the Mabe reference for teachings related to the '573 patent. As acknowledged in the Kelly report, the Chernow patent is directed to purchasing software, not digital audio or video signals.¹⁰² The Chernow patent's disclosure of "running" a program is not the same as "playing" digital audio signals or digital video signals. Similarly, the Walter patent does not disclose the storage, and thus playback of, digital audio or video signals in/from non-volatile memory.¹⁰³ The passage the Kelly report relies upon in the Hamilton patent indicates that the "reconstructed data" for display "is in the RAM of the frame grabber," not non-volatile memory.¹⁰⁴ The Hamilton patent is directed to the transmission, storage and retrieval of

¹⁰⁰ See '440 Prosecution History, 1/13/1998 Response and Remarks at 2, 5-7; *id.*, 6/9/1998 Brief on Appeal; *id.*, 9/15/1998 Notice of Allowance.

¹⁰¹ Kelly report, Ex. R at 7.

¹⁰² See, e.g., Kelly report, Ex. R at 8.

¹⁰³ Exs. O & P.

¹⁰⁴ See, e.g., Kelly report, Ex. R at 8.

still pictures not the real-time playback of digital audio and video signals.¹⁰⁵ The Chernow patent, Walter patent, Mabe reference (disclosing a “slave station,” which by its very name would lead those of ordinary skill in the art to conclude that it was under the control of a first party) also all suggest that second party control units are under the control/possession of the first party, not the second party.^{106,107}

¹⁰⁵ Hamilton at 57:52–54.

¹⁰⁶ The Chernow patent is directed to “the sale of computer software” including “the sale and distribution of computer software via telephone.” Chernow at 1:5–7. The Chernow patent discloses the use special control software that is designed to “protect the transmitted software from being proliferated.” 2:43–44.

k. The Interactive Program on the central computer takes control of the customer’s computer as the “user” at the completion of the Initialization Program. The Initialization Program transfers control to the central computer by designating the modem port as the console. After the Initialization Program is executed, the keyboard is deactivated. All subsequent commands will be entered from the modem port.

l. Execute the Control Transfer Program and transmit the Primary Protection Program to the customer’s computer. The rationale for providing a special transfer program to receive the programs is to prevent the customer from using a transfer program that could make multiple copies of the transmitted programs. e.g., on floppy disks and hard disks.

m. Execute the Primary Protection Program and erase it from the customer’s computer when it has completed its tasks. The Primary Protection Program is erased, since it’s [sic] only purpose is to protect against certain types of theft. The less known about these programs the better are the chances that their action will not be defeated.

n. Execute the Control Transfer Program and transmit the Storing Program and the Target Program to the customer’s computer. This is done once the Primary Protection Program has been run and there is reasonable assurance that neither of these programs can be copied without authorization.

o. Execute the Storing Program. Upon execution of the Storing Program, a series of protection mechanisms are invoked that will prevent the unauthorized use of the Target Program after control of the customer’s computer is returned to the customer.

8:6–38 (emphasis added); *see also* 13:34–41. Chernow discloses the seller’s central computer taking control of the purchaser’s computer in order to transmit and store any purchased computer software.

¹⁰⁷ The Walter patent discloses a receiving system in the possession and control of the first party. Walter describes the data receiving station in the following terms:

[D]ata receiving station 14 includes four photo-diode modules 86, 88, 90, 92 optically connected to fiber optic lines 62, 60, 58, 56, by fiber optic lines 94, 96, 98, 100, respectively. It is emphasized that fiber optic lines 56-62, which make up four of the five lines in multi-fiber data bus 16, continue on as illustrated in FIG. 1 by arrows to additional users. Each photodiode module 86-92 includes four filters, four photodiodes, and four demodulators connected in series as illustrated in FIG. 4, a more detailed description of which will continue below.

Walter at 4:39–49. The Walter patent also characterizes the “data receiving station” as being connected to a broadcasting device for the broadcasting the optical data that has been converted back into electrical data. Walter at 2:48–3:16 (“a broadcasting device electrically connected to the data receiving station for receiving and broadcasting

191. Indeed, the particular passages the Kelly report highlights in the identified prior art references do little to motivate a person of ordinary skill in the art to essentially rewrite claims 3 and 6 of the '573 patent. Claims 3 and 6 of the '573 patent are not directed to the actions performed by the second party once digital audio or video signals are transmitted from the first party. The Kelly report in effect selectively finds missing elements in the prior art and adds them to claims of an earlier patent, which I understand to be improper in an obviousness-type double patenting analysis.

192. Accordingly, playing digital signals with specific components of the second party, as recited in claims 1, 64 and 95, are patentable and non-obvious variations from the '573 patent claims.

IX. Supplemental or amended opinion

193. I reserve the right to supplement or amend my opinions in response to opinions expressed by Apple's experts, or in light of any additional evidence, testimony, discovery, or other information that may be provided to me after the date of this report.

X. Exhibits

194. During my testimony at trial in this litigation, I may rely on visual aids and demonstrative exhibits that demonstrate the basis of my opinions and that may assist me in explaining the technical subject matter about which I may testify. Examples of these visual aids

the electrical data transmitted"). Because Walter discloses that the data receiving station must be connected to a broadcasting device (with the broadcasting device being used to broadcast the electrical signals into the user's home), those of ordinary skill in the art would understand that the data receiving station is in the control of the cable operator and not the user. If the data receiving station were in the possession and control of the user, a further broadcasting device for broadcasting the electrical signals would not be needed to transmit the electrical signals for the user's viewing. Indeed, as disclosed in Bradley (U.S. Patent No. 4,878,245), the data receiving station would be located outside of the user's house and could, for example, service an entire neighborhood. Bradley at Fig. 14, 19:24-39. Those of ordinary skill in the art would also understand that data receiving stations were meant to service more than one household because each data receiving station includes four fiber optic input lines. Given the cost of fiber optic cabling, those of ordinary skill in the art would understand that such a configuration would only be realistic and feasible if it serviced multiple households. Thus, the data receiving station of Walter, and any memory devices contained within it, is disclosed as being in the possession and control of the cable operator and not the user.

and demonstrative exhibits include claim charts, patent drawings, excerpts from the patent specifications, file histories, interrogatory responses, deposition testimony and exhibits as well as charts, diagrams, videos, models and animated or computer-generated video presentation describing the technology relevant to the asserted claims and the prior art. I have not yet prepared any exhibits for use at trial in support of the opinions expressed in this report, but I expect to do so in accordance with the Court's scheduling order.

Exhibit A

John Snell

Curriculum Vitae

Experience

1988-present Engineering Consultant: Design, analysis, testing and reverse-engineering of circuit microelectronics, software & systems for consumer and professional systems. Work has focused on digital video and audio processors, special-purpose chips and FPGAs for real-time systems, networks and multi-processor systems. Projects have included: multi-channel cable network digital video/audio server, digital audio and video compression, high-bandwidth switching and routing systems, video/audio set-top boxes, digital signal processors, MP3 players and smart phone applications, media processor system on a chip for personal computer video and audio, music synthesizers and samplers, satellite digital broadcast network, digital signal processing mathematics, multi-channel high-bandwidth recorders and a media editor. Expert witness: analyzed hundreds of patents, tested and reverse engineered potential prior art, prepared reports and exhibits, and testified in deposition and court.

1986-1988 University of California: Research Engineer: real-time multiprocessor research & design for digital media signal processing; design seminars covering this research.

1980-1986 Lucasfilm Ltd.: Computer Research & Development Engineer: engineering design of micro-electronics, software & systems for recording, processing & editing digital media.

1977-1980 Engineering Consultant (design & analysis of circuit micro-electronics, computer design and development, software & systems for recording & processing digital media).

1976-78 *Computer Music Journal*, MIT Press: Founder and Editor-in-chief of this peer-reviewed academic journal focused on research and design of digital audio systems and software (in publication for over 35 years).

1975-76 ARGOSystems: Electronics Engineer: design, development, programming & debugging of microelectronics & software for real-time, microwave signal analysis system.

1973 Carnegie-Mellon University, Electrical Engineering Dept.: Instructor (electronics circuit design)

1972-74 Carnegie-Mellon University, Computer Science Dept.: Electronics Technician: development and troubleshooting of micro-electronics, including multiprocessor (crossbar switch connecting 16 computers and 16 shared memory banks), digital audio A/D/A converters, and computer graphics display system.

1971 PBS (WQED) Television: Internship in video/audio television broadcasting network.

Education

1992 Stanford University: digital signal processing (advanced mathematics for media processing).

1978-1980 Stanford University: guest researcher.

1967-74 Carnegie-Mellon University: interdisciplinary graduate work in electrical engineering (focused on digital media processing & synthesis) with grant from National Science Foundation; BS in Electrical Engineering; BA in Cybernetics (interdisciplinary program, combining coursework in computer science, calculus and signal processing mathematics, physics, music analysis and composition, psychology and physiology of perception as well as audio, video and electrical engineering).

Honors and Service

John Snell served from 1992-95 on the Editorial Review Board of *Microprocessor Report*, a prestigious publication on integrated circuit design analysis (focusing on design of media processors and advanced memory).

In Sept., 2000 the Audio Engineering Society honored John Snell with a Fellowship Award for innovative digital audio engineering design and valuable contributions to the advancement of audio engineering.

John Snell has been an invited lecturer and given workshops at numerous international conferences, research centers and universities, including Audio Engineering Society international conferences, International Computer Music Conferences, IEEE International Conference on Signal Processing Applications and Technology, Stanford University, IRCAM, University of California, Microprocessor Forum, Eastman School of Music, Northwestern University, DSPx, IEEE Mini/Micro West, WCCF, Mills College and Carnegie-Mellon University.

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