

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SAMSUNG ELECTRONICS CO., LTD.,
Petitioner,

v.

ONE-E-WAY, INC.,
Patent Owner.

Case: IPR2025-01541
U.S. Patent No. 9,107,000

**DECLARATION OF MICHAEL ALLAN MARTIN DAVIES
IN SUPPORT OF *INTER PARTES REVIEW* OF CLAIMS 1-5, 8-12 OF
U.S. PATENT NO. 9,107,000**

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I, Michael Allan Martin Davies, do hereby declare as follows:

I. INTRODUCTION

1. I make this declaration based upon my own personal knowledge and, if called upon to testify, would testify competently to the matters stated herein.

2. I have been asked to provide my expert opinion in connection with the Petition for *Inter Partes Review* of U.S. Patent No. 9,107,000 (“the ’000 patent”) to Woolfork concerning whether the ’000 patent is unpatentable over certain prior art. This declaration is a statement of my opinions on issues relating to the patentability of claims 1-5 and 8-12 (the “Challenged Claims”) of the ’000 patent. As I explain more fully below, it is my opinion that all of the Challenged Claims would have been obvious to a person of ordinary skill in the art (“POSA”) at the time of the alleged invention.

3. I have been retained on behalf of Samsung Electronics Co., Ltd. (“Petitioner”). I am being compensated for my work in this matter at my standard hourly rate. I am also being reimbursed for reasonable and customary expenses associated with my work and testimony in this investigation. My compensation is not contingent on the outcome of this matter or the specifics of my testimony.

4. I have reviewed and considered the following documents in connection with my analysis of the '000 patent:

Exhibit	Description
1001	U.S. Patent No. 9,107,000 to Woolfork ('000 patent)
1002	File history of U.S. Application No. 16/185,786, filed on November 9, 2018 ("the 2018 application")
1003	File history of U.S. Application No. 10/027,391, filed December 21, 2001 ("the 2001 application"), as originally filed in <i>Sony Corp. v. One-E-Way, Inc.</i> , IPR2016-01638 as Exhibit 1003
1004	U.S. Publication No. 2003/0118196 ("the '196 publication") , as originally filed in <i>Sony Corp. v. One-E-Way, Inc.</i> , IPR2016-01638 as Exhibit 1004
1005	File history of U.S. Application No. 10/648,012, filed August 26, 2003 ("the 2003 application"), as originally filed in <i>Sony Corp. v. One-E-Way, Inc.</i> , IPR2016-01638 as Exhibit 1005
1006	U.S. Patent No. 7,412,294, as originally filed in <i>Sony Corp. v. One-E-Way, Inc.</i> , IPR2016-01638 as Exhibit 1006
1007	Excerpts from file history of U.S. Application No. 12/144,729, filed July 12, 2008 ("the 2008 application"), as originally filed in <i>Sony Corp. v. One-E-Way, Inc.</i> , IPR2016-01638 as Exhibit 1007
1008	Comparison of the 2003 application as-filed with the 2001 application as-filed, as originally filed in <i>Sony Corp. v. One-E-Way, Inc.</i> , IPR2016-01638 as Exhibit 1008
1009	Comparison of figures from the 2003 and 2001 applications as-filed, as originally filed in <i>Sony Corp. v. One-E-Way, Inc.</i> , IPR2016-01638 as Exhibit 1009
1010	Comparison of the '294 patent with the as-filed 2003 application, as originally filed in <i>Sony Corp. v. One-E-Way, Inc.</i> , IPR2016-01638 as Exhibit 1010
1011	Comparison of the 2008 application as-filed with the 2012 application as-filed
1013	<i>One-E-Way, Inc. v. Apple Inc.</i> , No. 2:20-cv-06339, Dkt. 86 (C.D. Cal. Mar. 9, 2022) ("Apple Markman order")

Exhibit	Description
1014	<i>In the Matter of Certain Consumer Elecs. And Display Devices with Graphics Processing and Graphics Processing Units Therein</i> , 337-TA-943, Order 12 (ITC July 24, 2015) (“ITC Markman order”)
1015	U.S. Patent No. 6,744,808 (“Walley”)
1016	U.S. Patent No. 5,546,424 (“Miyake”)
1017	Reserved
1018	“Wireless Communications: Principles & Practice” by Theodore S. Rappaport (1996) (“Rappaport”)
1019	Reserved
1020	Reserved
1021	U.S. Patent No. 6,256,303 (“Drakoulis”)
1022	“The Communications Handbook” (1997) by Jerry D. Gibson (“Gibson”)
1023	One-E-Way’s Opening Claim Construction Brief <i>One-E-Way, Inc. v. Apple Inc.</i> , 2:20-cv-6339-JSK-PD (D.I. 65) (C.D. Cal. Dec. 6 2021)
1024	Order Re Motion For Summary Judgment of Non-Infringement (“ <i>Apple</i> Summary Judgment Order”) <i>One-E-Way, Inc. v. Apple Inc.</i> , 2:20-cv-6339-JSK-PD (D.I. 102) (C.D. Cal. June 15, 2022)
1025	Library of Congress Record for “Wireless Communications: Principles & Practice” by Theodore S. Rappaport (1996)
1026	U.S. Patent No. 5,933,421
1027	Library of Congress Record for “The Communications Handbook” (1997)
1028	U.S. Patent No. 5,953,669
1029	Opinion Affirming <i>Apple</i> Summary Judgment Order <i>One-E-Way, Inc. v. Apple Inc.</i> , 2022-2020 (D.I. 32) (Aug. 14, 2023)
1030	<i>Curriculum Vitae</i> , Michael Allan Martin Davies

Exhibit	Description
1031	Attachment A-12 to <i>One-E-Way, Inc. 's Infringement Contentions in One-E-Way, Inc. v. Samsung Electronics Co., Ltd.</i> , 1:24-cv-1561 (W.D. Tex.), served on June 26, 2025

5. In forming the opinions expressed below, I have considered:

- a) the documents listed above;
- b) the relevant legal standards, including the standard for obviousness, and any additional authoritative documents as cited in the body of this declaration; and
- c) my own knowledge and experience based upon my work in the field of wireless communications as described below, as well as the following materials.

6. Unless otherwise noted, all emphasis in any quoted material has been added.

II. QUALIFICATIONS AND PROFESSIONAL EXPERIENCE

7. My complete qualifications and professional experience are described in my *Curriculum Vitae* ("C.V."), a copy of which can be found in Exhibit 1030. The following is a brief summary of my relevant qualifications and professional experience.

8. I received a Bachelor of Arts and a Master of Arts in Engineering and in Electrical Sciences from St. Catharine's College at the University of Cambridge;

a Master of Engineering in Cybernetics, Robotics, and Microelectronics from the University of Durham; and a Master of Business Administration from London Business School (with Distinction). My educational work focused on engineering, physics, computer science and mathematics; cybernetics and robotics; microelectronics including the design of microchips; and management science with particular focus on technology, innovation, and business strategy.

9. I am the Founder and Chairman of Endeavour Partners, LLC, a boutique strategy consulting and expert advisory firm. I also serve as a Senior Lecturer and Principal Investigator at the Sloan School of Management and the School of Engineering at the Massachusetts Institute of Technology (“MIT”) and teach in the Integrated Design and Management and Professional Education programs. I also serve as a Guest Lecturer at London Business School for programs involving strategy, entrepreneurship, technology, and innovation, am the creator and director of the Business of AI program and teach on the MBA programs.

10. For approximately the last 35 years, I have worked in wireless and broadband communications, mobile computing, consumer electronics, and related industries, and with businesses harnessing these technologies. I worked first for approximately a decade as an engineer in high-tech manufacturing, then for approximately a decade as a manager and executive, focusing on the wireless, mobile, telecommunications and internet sectors, and for the last twenty-five years

or so as an expert consultant and advisor, educator and entrepreneur.

11. I have worked for a wide variety of technology and manufacturing companies on issues relating to research and development, product development, manufacturing, logistics, supply chain management, technology, strategy, and innovation. My work primarily involves the connections amongst technology, innovation, research and development, new product adoption and diffusion, consumer choice and behavior, business models, and the emergence and evolution of business ecosystems.

12. I have experience working throughout the digital and mobile sectors, including at the convergence of mobile technologies, broadband Internet, consumer electronics, computing, software, semiconductors, and other digital technologies. My work in this area extends to mobile devices including cellphones, smartphones, and tablets, communication services and networks (wireless and broadband Internet), computers (components, hardware, and software), electronic hardware (semiconductors and integrated circuits, printed circuit board design, and manufacturing), consumer electronics, the Internet of Things (“IoT”), artificial intelligence (“AI”), robotics, and the related areas of content (video, audio, applications and software), electronic commerce, software (from embedded systems to cloud services), and artificial intelligence.

13. I began my career in the manufacturing sector on the design,

development, and deployment of mechanical, electrical, and high-tech products. For example, in the mid 1990s as Chief of Strategy for BellSouth NZ (now One NZ), I collaborated with Apple and Nokia on digital connectivity for the Apple Newton and then worked with Nokia on the development and testing of the Nokia Communicator 9000, the first smartphone that used digital connectivity. During my time in that role between 1992 and 1998 I also served as New Zealand's representative to the ITU-R Task Group 8/1 on Future Public Land Mobile Telecommunications Systems ("FPLMTS"), chaired the New Zealand Working Party on wireless spectrum for Personal Communications Services ("PCS") technologies spectrum, and was elected a Vice Chairman of the GSM MoU¹ (the largest global group of mobile network operators) and founded and led its 3rd Generation Interest Group ("3GIG"). I continued to work on these and related issues involving short-range wireless communications such as Code Division Multiple Access ("CDMA"), Bluetooth, IEEE 802.11, and 802.15.4, Zigbee and Near Field Communications ("NFC") intensively throughout the next several years through the early 2000s.

14. Since then, I have focused on mobile-, communications-, and

¹ Global System for Mobile ("GSM") Memorandum of Understanding ("MoU"); the name of the global organization of mobile network operators deploying the GSM family of digital mobile services and technologies

computing-related issues, including developing effective business strategies. In particular, I have done extensive work on what is involved in designing, developing, and bringing to market complex consumer electronics, including smartphones, tablets, and personal computers; building new business models; the challenge of incorporating high-end technologies; and supply chain management.

15. I have significant experience serving as an expert consultant in this field. I served as an industry expert for the Department of Justice (DoJ) in 2011 in the anti-trust investigation of the proposed AT&T and T-Mobile merger. In this role, I analyzed the impact of the proposed merger, in particular as it related to the technology and economics of mobile networks and wireless services, and to consumer choice.

16. I also served as the DoJ's industry expert for its antitrust investigation into the proposed T-Mobile and Sprint merger, for a criminal trade secrets case against Chinese device vendor Huawei, and for the civil antitrust case against Google, and on a number of other non-public matters involving telecommunications and mobile communications.

17. I have served as an expert witness in several International Trade Commission ("ITC" or the "Commission") investigations related to the information and communications technology industry and public interest matters. A full list of those investigations is attached in my C.V.

18. I have also served as a technical expert in recent United States District Court Patent Infringement cases helping establish invalidity and noninfringement in U.S. District Court Cases. A full list of these cases can also be found attached in my C.V.

19. My C.V. includes additional details about my education, professional background, and prior testifying experience.

III. LEVEL OF ORDINARY SKILL IN THE ART

20. I understand there are multiple factors relevant to determining the level of ordinary skill in the pertinent art, including (1) the levels of education and the experience of persons working in the field at the time of the invention; (2) the sophistication of the technology; (3) the types of problems encountered in the field; and (4) the prior art solutions to those problems.

21. I understand that the '000 patent was filed on January 24, 2012.

22. My analysis reflects the views of a POSA in the field of the '000 patent. A POSA would have had a Bachelor of Science (or equivalent) degree in electrical engineering or a related field, and approximately two years of experience in the design or implementation of wireless communications systems, or the equivalent. Alternatively, a person of ordinary skill in the art has approximately six years of experience in the design or implementation of wireless communications systems, or the equivalent.

23. For purposes of this Declaration, my statements and opinions, such as those regarding my experience and the understanding of a POSA generally, and specifically related to the references I consulted herein, are rendered from the perspective of a POSA as of the December 21, 2001 date.

IV. RELEVANT LEGAL STANDARDS

24. I am not an attorney. In preparing and expressing my opinions and considering the subject matter of the '000 patent, I am relying on certain basic legal principles that counsel have explained to me. These principles are discussed below.

25. I have been informed that the claims of the '000 patent are to be given their ordinary and customary meaning as understood by a person of ordinary skill in the art. I have been asked to apply this claim construction standard when I render my opinions on patentability set forth in this declaration.

26. I understand that prior art to the '000 patent includes patents and printed publications in the relevant art that predate the proper priority date of the alleged invention recited in the '000 patent.

27. I have been informed that a claimed invention is unpatentable under 35 U.S.C. § 103 if the differences between the invention and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which the subject matter pertains. I have also been informed by counsel that the obviousness analysis takes into

account factual inquiries including the level of ordinary skill in the art, the scope and content of the prior art, and the differences between the prior art and the claimed subject matter.

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

29. I further understand that certain factors may support or rebut the obviousness of a claim. I understand that such secondary considerations include, among other things, commercial success of the patented invention, skepticism of those having ordinary skill in the art at the time of invention, unexpected results of the invention, any long-felt but unsolved need in the art that was satisfied by the

alleged invention, the failure of others to make the alleged invention, praise of the alleged invention by those having ordinary skill in the art, and copying of the alleged invention by others in the field. I understand that there must be a nexus—a connection—between any such secondary considerations and the alleged invention. I also understand that contemporaneous and independent invention by others is a secondary consideration tending to show obviousness.

30. I am not aware of any evidence of secondary considerations.

V. SUMMARY OF THE '000 PATENT

A. General background regarding the claims and specification

31. The '000 patent has twelve claims. Claims 1-3, 5-10 are independent claims. The '000 patent was filed on January 24, 2012.

32. The '000 patent generally relates to a wireless digital audio system which includes a portable audio source with a wireless digital audio transmitter and a wireless audio receiver coupled to a headphone set, which is configured for digital wireless communication with the audio transmitter. (EX1001 at Abstract).

33. An embodiment of the alleged invention is depicted in FIG. 1, which is

reproduced below:

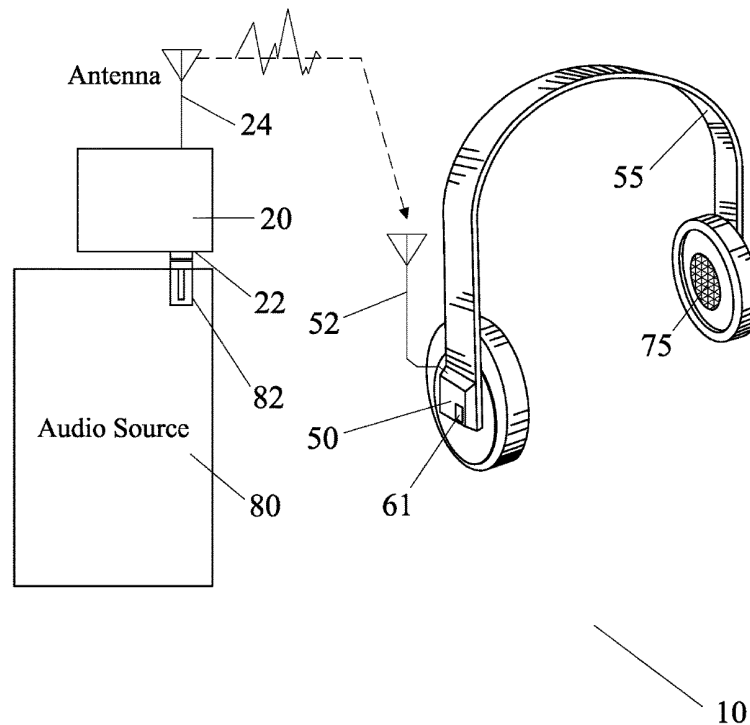


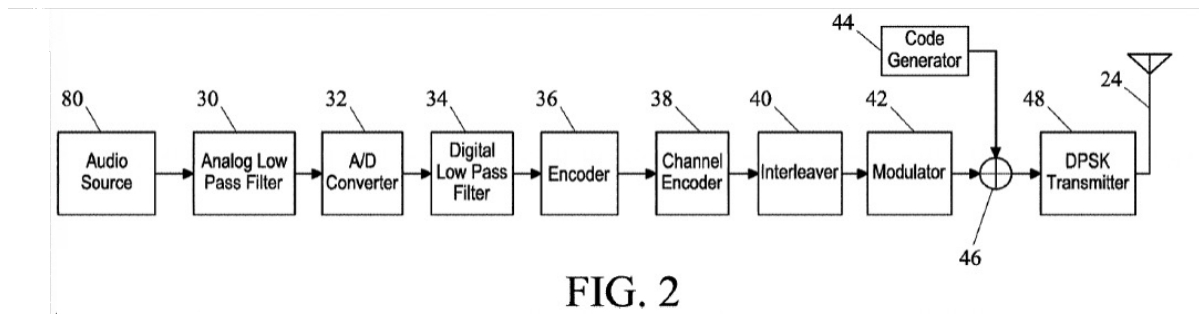
FIG. 1

(EX1001 at FIG. 1).

34. FIG. 1 depicts an exemplary embodiment of the invention. The audio source 80 is connected to a wireless transmitter 20, which transmits audio wirelessly using a transmitting antenna 24 to a receiving antenna 52 of a battery powered headphone receiver 50.

35. The speakers 75 in headphones 55 are used for listening to the spread spectrum-demodulated and decoded communication signal. (EX1001 at 2:40-3:6).

36. FIG. 2 reproduced below, depicts a block diagram of an audio transmitter of the wireless digital audio system of FIG. 1:



(EX1001 at FIG. 2).

37. In the transmitter 20 depicted in FIG. 2, the audio source 80 is filtered by an analog low pass filter 30. This filtered audio signal is then digitized using an analog to digital converter (ADC) 32.

38. This digitized signal is then **filtered** by the digital low pass filter 34, and **encoded**, by the encoder 36.

39. This digitized and encoded signal is then **processed by the channel encoder** 38 to reduce the effect of channel noise and processed by the interleaver 42 to reduce the effect of inter-symbol interference.

40. This signal is then **modulated**, by the modulator 42. The code generator 44 generates a **unique code that is specifically associated with one user** of the wireless digital audio system. EX1001, 2:55-3:6. A spread spectrum differential phase shift key (DPSK) module 48 that uses this unique user code to improve noise immunity then transmits the signal through the transmit antenna 24.

41. This transmission uses **code division multiple access in which the**

unique code associated with one user makes the transmission independent of any central control and ensures that other signals that utilize other code words appear as noise. As a result, the user may enjoy private listening without interference from other users.

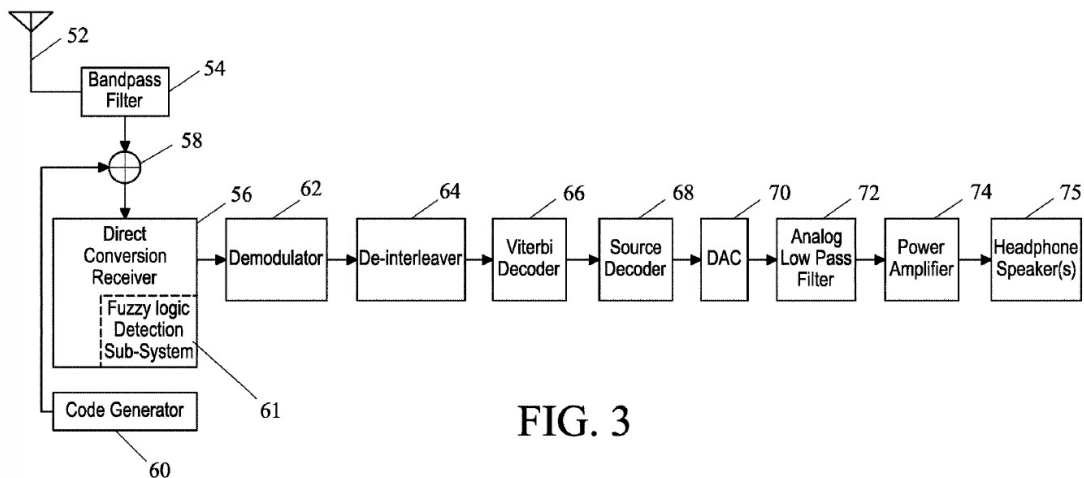


FIG. 3

(EX1001 at FIG. 3).

42. The spread spectrum modulated signal transmitted by the antenna 24 is received by the antenna 52 shown in Figure 3.

43. This received signal is then processed by a spread spectrum direct conversion receiver or module 56 in conjunction with a receiver code generator 60 that provides **the same unique code that is specifically associated with one user of the digital audio system.** This is the only code that is recognized by the receiver.

44. This reception uses code division multiple access (“CDMA”) in which the unique code is associated with one user and is independent of central control. In

CDMA, other signals which use different code words to modulate the signal appear as noise and the system provides its one user with private listening without interference.

45. The direct conversion receiver 56, which is an element of the receiver 50, may utilize fuzzy logic detection in the fuzzy logic detection sub-system 61 to enhance bit detection and thereby optimize reception of the received unique user code.

46. A block de-interleaver 64 restores the original order of the bits of the digital signal that were reordered in the block interleaver 40, and then a Viterbi decoder 66 is used to decode the bits that were encoded by the channel encoder 38, and a source decoder 68 decodes the coding that was applied by the encoder 36.

47. A digital-to-analog converter (DAC) 70 is then used to transform the digital signal to an analog audio signal, which is then filtered by an analog low pass filter 72 and then processed by a power amplifier 74 that is optimized for powering the headphone speakers 75 to provide high quality low distortion music. EX1001, 3:7-41, 4:28-39.

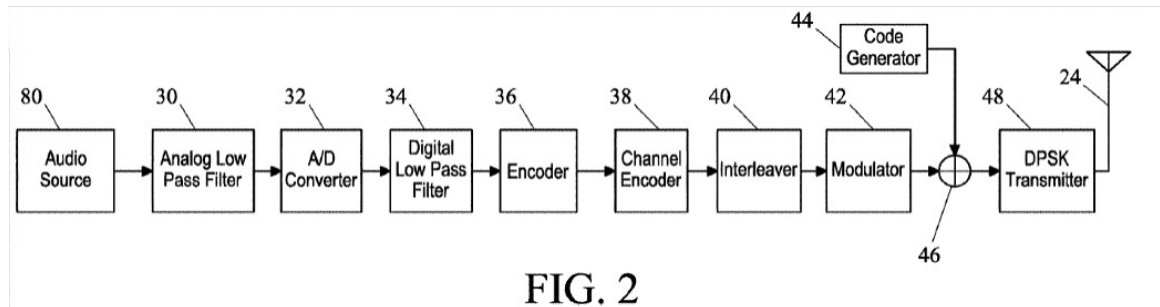
B. Simplified explanation of the elements of the transmitter and receiver of the '000 Patent

Transmitter

48. I understand that the claim term “transmitter,” as recited in Challenged

Claims of the '000 patent, was construed by the Court in the *Apple* Action to mean “a device that can be connected into an analog headphone jack to wirelessly transmit an audio signal” with respect to the '000 patent. See §VII.

49. In Fig. 2 below, a transmission starts with an analog audio source, that is an audio signal, which is then filtered, converted from analog to digital, encoded, modulated, and finally wirelessly transmitted over the air, leveraging a unique spreading code. Each of these steps are explained in more detail below.



(EX1001 at FIGS. 2).

Analog low pass filter

50. The **analog low pass filter** receives an analog audio signal from an audio source (for example, from a radio, cassette player, CD player, or computer). That signal is then filtered to remove higher frequency noise or unwanted signals, by blocking frequencies above a desired level. EX1018, 373. This creates a cleaner analog audio signal that can flow to the next step, without interference or unwanted elements.

AD converter

51. An **AD converter**, or Analog-to-Digital converter, takes an analog audio signal such as music, and converts it into a digital signal. This conversion is performed by sampling the original signal (through the sampling process) and turning it into binary digits or bits (“1s” and “0s”) (through the quantization process) that can be transmitted through and processed by a digital system, such as a computer. EX1022, 107, 110, 111, 121, 122.

Digital low pass filter

52. In a similar way to the analog low pass filter, the **digital low pass filter** rejects higher, unwanted frequencies or noise in the digital domain, thus creating a cleaner signal.

Encoder

53. The **encoder** then takes the raw digital signal and reduces the transmit bit rate when there is less information in the signal, such as during silent periods for voice signal (pauses and gaps in speech), thereby compressing the digital signal and minimizing the average bit rate for its transmission. EX1018 p. 387, 388, Figure 7.10, 516, Figure 10.11, 522, 530

54. Music specific encoders that have a wider passband are generally used for music.

Channel encoder

55. The **channel encoder** takes the compressed digital signal from the encoder described above and adds redundancy to it in the form of error detection and correction codes. EX1022, 166, 167, 1254, FIGURE 88.5. The channel encoder introduces this redundancy to ensure that any errors caused by extraneous noise during transmission can be detected and corrected by the receiver.

56. The channel encoder may use one of two methods for adding error correction: forward error control (“FEC”) (EX1022, 166, 1343) or automatic repeat request (“ARQ”) (EX1022, 181, 182). In FEC, extra redundant bits (error correction codes, “ECCs”) are added to the compressed digital signal and are used by the Viterbi decoder to determine where errors have occurred in the bitstream and how to correct them. EX1022, 166, 1343. In ARQ, extra redundant bits are added to the compressed digital signal and used by the receiver to detect errors. EX1022, 181, 182. When the receiver detects an error it sends the transmitter a request for a repeat transmission. EX1022, 181, 182.

Interleaver

57. While the channel encoder provides error correction, in the form of error correcting codes (ECCs), in an attempt to avoid or mitigate errors and maintain the data fidelity of a transmission, this method is not effective in maintaining quality when dealing with burst errors. Burst errors occur when several consecutive bits or

blocks of data are transmitted with errors.

58. The **interleaver** reorders the bits or blocks of the digital signal from the channel encoder, with the goal of avoiding or mitigating the impact of “burst errors” which might affect a block of contiguous data. Such errors can result from a burst of interference or a short period of low signal strength. EX1022, 177, 179, 1254, Figure 88.5. The interleaver functions to distribute the errors over multiple blocks of data so that error correction methods (employed by the channel encoder and Viterbi decoder) are able to work more effectively, in particular in the event of “burst errors”. *Id.* Essentially, it is easier to fix one error in a sequence of good data rather than to correct multiple contiguous errors (burst errors) in a block of good data.

Modulator

59. A **modulator** receives an information signal or modulating signal (the digital signal from the output of the channel encoder containing the data to be transmitted) and a carrier signal (a high-frequency, simple periodic waveform that does not carry any information) and uses the information signal to alter the carrier signal’s amplitude (height), frequency (the number of waves that pass through in a given second), or phase (whether the wave is at a peak or trough). EX1018, 220-222. EX1022, 273. In digital modulation these alterations are known as amplitude-shift keying (ASK), frequency-shift keying (FSK), and phase-shift keying (PSK). EX1018, 267. EX1022, 279, 281, 287. The resulting modulated wave is capable of

transmitting the data of interest with more bandwidth efficiency. EX1018, 267.

Code generator

60. In code division multiple access (“CDMA”) multiple users transmit on the same frequency band, with each user’s transmission separated from one another’s by a dedicated spreading code. EX1022, 94, 105. EX1018 6, 275, 336, 405, 527. The dedicated spreading code spreads the data to be transmitted over a wide bandwidth. The dedicated spreading code may be referred to as Pseudo Noise (“PN”) code, Pseudo Random (“PR”) code, spreading codes, despreading codes, or orthogonal codes. EX1022, 94, 105. EX1018, 275, 336, 408, 527. The **code generator** creates these distinct spreading codes for each user and correlates the code to the modulated signal for each user (by multiplying the modulated signal, bit-by-bit, with the spreading code and summing the result). EX1018, Figure 5.49, 276, 277. By correlating the modulated signal with a distinct spreading code for each user, users are able to transmit over the same frequency spectrum without other users being able to receive their signal. *Id.* By spreading the modulated signal across a larger bandwidth, it can be transmitted with lower power and tolerate a greater interference. EX1018, 278.

Differential Phase Shift Keying (DPSK) module

61. DPSK (Differential Phase Shift Keying) is a type of modulation in which the phase of the carrier wave’s phase is altered on the basis of the information

signal to be transmitted. EX1018, 242, 243.

62. The differentially encoded sequence $\{d_k\}$ is generated from the input binary sequence $\{m_k\}$ by complementing the modulo-2-sum of m_k and d_{k-1} . The effect is to leave the binary symbol d_k unchanged from the previous symbol if the incoming binary symbol m_k is 1, and toggle to d_k if m_k is 0. EX1018, 242, 243, Table 5.1.

Table 5.1 Illustration of the Differential Encoding Process

$\{m_k\}$		1	0	0	1	0	1	1	0
$\{d_{k-1}\}$		1	1	0	1	1	0	0	0
$\{d_k\}$	1	1	0	1	1	0	0	0	1

DPSK Modulation: EX1018, 242, 243, Table 5.1.

63. In DPSK the phase of the signal tracks the peak (1) or valley (0) state of the earlier element, obviating the need for a synchronous carrier at the demodulator. EX1018, 242, 243, Table 5.1. The **DPSK module** amplifies the DPSK modulated signal to increase its power and range and sends it on to an antenna where it is transmitted over the air to the receiver.

Receiver

64. The **receiver** performs the reverse steps to those that were performed by the transmitter. It receives the signal that has been transmitted over the air from the antenna of the transmitter, and goes through a series of steps to produce an audio signal that can be ultimately heard by a user through their headphone or speaker.

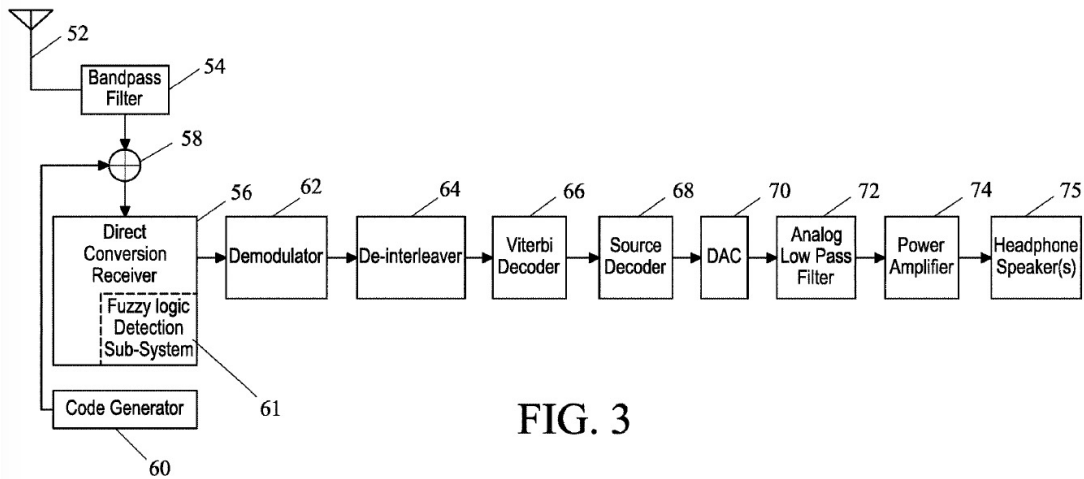


FIG. 3

(EX1001 at FIG. 2).

Direct conversion receiver

65. The RF signal comes in through the antenna and into the **direct conversion receiver** (“DCR”) module. The DCR is also known as a Zero-Intermediate Frequency (“Zero-IF”) receiver as it functions to convert the signal received by the antenna directly from RF to baseband using an intermediate frequency that is nominally at zero frequency. EX1022, 1323.

Receiver code generator

66. The baseband output of the direct conversion receiver module is summed with the signal from the receiver code generator, by the receiver summing element. The **receiver code generator** contains the same distinct spreading code that was transmitted by the transmitter that is specific to a particular user. EX1018, Figure 5.49, 276, 277, 336, 405. Any wireless transmission signals without the

distinct spreading code specific to the particular user will appear as noise to the receiver and be ignored. As a result, the output of the receiver summing element is a “despread” baseband representing only baseband that is associated with the distinct user specific spreading code. EX1022, 200.

Demodulator

67. The **demodulator** takes the despread baseband signal from the receiver summing element and extracts the original information signal from the modulated carrier wave, in the reverse process from modulation. EX1018, 278, Figure 5.50 and Figure 5.49.

De-interleaver

68. The **de-interleaver** similarly reverses the transmitter’s interleaver process, returning the bits of the original signal back into the proper order. EX1018, 338.

Viterbi decoder

69. The **Viterbi decoder** performs the reciprocal function to the channel encoder in the transmitter, it conducts error correction (using FEC or ARQ) and removes the redundancy that was put in place by the channel encoder in the process. EX1018, 315, 316, 354. The Viterbi decoder is a decoder for convolutional codes which uses the Viterbi algorithm (a maximum likelihood detector) to reconstruct the transmitted data sequence from the received data in the face of noise and other

interference. EX1018, 315, 316, 354. EX1022, 174.

Source decoder

70. The **source decoder** performs the reciprocal function to the encoder in the transmitter, it decompresses the output of the Viterbi decoder and restores the data to the original digital form of the audio source, prior to its encoding. EX1022, 169. EX1018, 387, 388, Figure 7.11.

DAC

71. The **Digital-to-Analog Converter (“DAC”)** takes the digital stream that corresponds to the output from the source decoder and turns it back into an accurate reconstruction of the original analog signal that can be sent, for example, to headphones or speakers as sound waves. EX1022, 107, 108, 110, 140.

Analog low pass filter

72. Similar to the **analog low pass filter** in the transmitter, the receiver’s **analog low pass filter** removes any unwanted higher frequencies or noise from the newly converted signal that may have crept in during the transmission or the conversion processes. EX1018, 241, 252.

Power amplifier

73. The **power amplifier** increases the power of the analog audio signal so that it is strong enough to travel over-the-air from the headphone speaker to the ultimate recipient. EX1018, 199. EX1022, 1199

Headphone speaker

74. The **headphone speakers** are final step in the chain, the physical device that produces the high quality, low distortion audible sound that can be heard by the end user.

C. High-level summary of the prosecution history

75. I understand that an overview of the prosecution history is provided in the Petition. I have reviewed the prosecution history relating to the '000 patent, and the overview provided in the Petition, which I adopt here, but as stated above I am not a lawyer and thus do not offer opinions on the overall process.

1. The 2001 Application

76. It is my understanding that the earliest application to which the '000 patent claims priority, entitled "Wireless Digital Audio System," was filed on December 21, 2001 and assigned U.S. Application No. 10/027,391 ("the 2001 application"). EX1003, p.3. As filed, the 2001 application included a 5-page specification, 7 claims, an abstract, and 3 figures (shown below). *Id.*, pp.4-22:

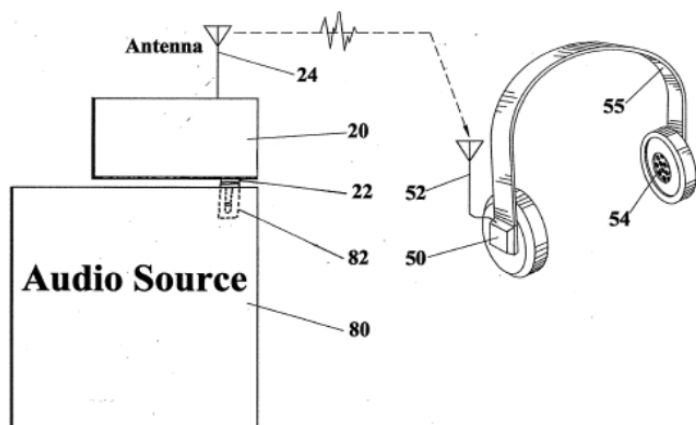


FIG.1

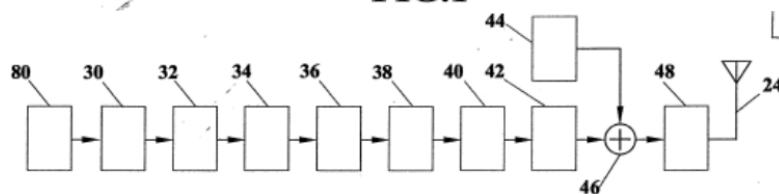


FIG.2

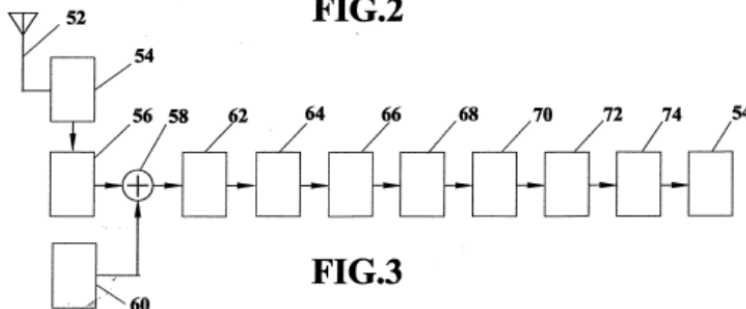


FIG.3

77. The 2001 application states that “[t]he present invention is directed to wireless digital audio systems for transmission of a signal from an audio player device to a headphone.” *Id.*, p.6. The 2001 application describes various details of the wireless digital audio system, including that “encoder 36 may be used to reduce intersymbol interference (ISI) by using a transform code to encode the digital signal”; “differential phase shift key (DPSK) transmitter 48 [] modulates the digital signal to be transmitted”; and “direct conversion receiver 56 may provide a method

for down converting the received signal.” *Id.*, pp.8-9. Figures 2 and 3 include functional block diagrams showing the components, including the encoder 36, DPSK transmitter 48, and direct conversion receiver 56, and operational flow of the audio transmitter and audio receiver, respectively. *Id.*, p.22.

78. On September 6, 2002, the examiner rejected all claims in the 2001 application as obvious under 35 U.S.C. § 103 in view of certain prior art. *Id.*, pp.26-36. On December 3, 2002, the applicant cancelled claims 1 and 2 in attempting to argue against the rejection. On February 26, 2003, the examiner again rejected the remaining claims as obvious in view of the prior art. *Id.*, pp.49-57. On August 27, 2003, the applicant expressly abandoned the 2001 application in favor of a continuation in part (CIP) application. *Id.*, p.60.

79. On June 26, 2003, shortly before abandonment, the 2001 application published as U.S. Publication 2003/0118196 (“the ’196 publication”). EX1004.

2. The 2003 Application

80. On August 26, 2003, the applicant filed a CIP application directed to a different invention, entitled “Fuzzy Audio Wireless Music System,” assigned U.S. Application No. 10/648,012 (“the 2003 application”). EX1005. As filed, the 2003 application included a 6-page specification, 5 claims, an abstract, and 2 figures (shown below). EX1005, pp.1-20.

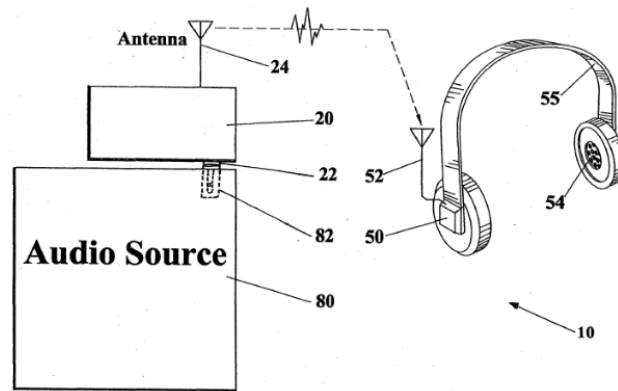


FIG 1

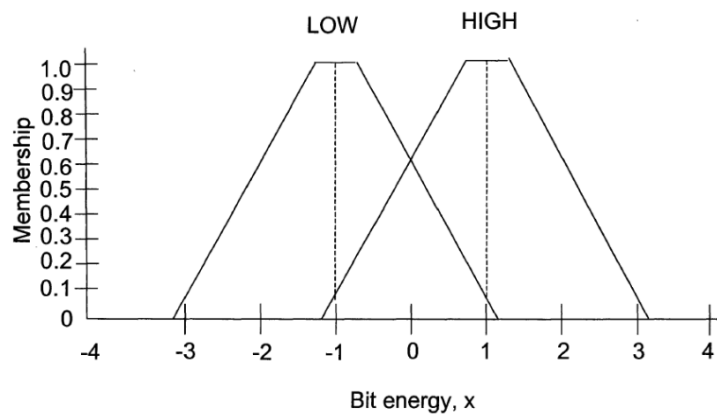


Figure 2

81. The 2003 application as filed did **not** incorporate by reference the 2001 application. The 2003 application as filed also differs substantially from the 2001 application. While figures 1 of both applications are nearly identical, figure 2 of the 2003 application differs from figures 2 and 3 of the 2001 application, which are not included in the 2003 application. *See* EX1009. In addition, the wireless audio system described in the 2003 application specification differs significantly from that described in the 2001 application. *See* EX1008.

82. For example, the 2003 application's "Summary of the Invention" states,

“[t]he present invention is directed to FAWM (Fuzzy Audio Wireless Music) systems for coded digital transmission of an audio signal from any audio player device with a headphone jack to a receiver headphone using fuzzy logic technology.” EX1005, p.2.

83. Unlike the 2001 application, the 2003 application does not disclose or describe a direct conversion receiver, differential phase shift keying, intersymbol interference, or an encoder or interleaver to reduce intersymbol interference. *Id.*, pp.3-6 (describing the fuzzy logic operations in detail and stating that “[t]he fuzzy logic detector is the key component to the FAWM system 10,” but not describing any of the aforementioned components).

84. The figures of the 2003 application also contain no functional block diagrams showing the components or operation of the fuzzy audio wireless music system of the invention. *Id.*, pp.16-17.

85. The '000 patent claims recite, among other things, reduced “intersymbol interference ” (cls. 1-12) and “a direct conversion module” (cls. 1-4). EX1001. In addition, independent claims 1, 3, and 5 recite “differential phase shift keying (DPSK).” *Id.* The 2003 application as filed does not disclose “intersymbol interference,” “a direct conversion module,” or “differential phase shift keying (DPSK).”

86. In October 2004, the applicant began amending the specification and

figures of the 2003 application, to both add and to remove material. A summary of the amendments is listed below:

- a. Adding an incorporation by reference of the 2001 application (EX1005, 0375);
- b. Adding description that the FAWM system utilized Bluetooth technology, including that the transmitter and the receiver are a Bluetooth compliant transmitter and receiver (EX1005, 0025-34);
- c. Broadening the disclosure by removing specifics, including removing the statement that “[t]he fuzzy logic detector is the key component to the FAWM system 10.” (EX1005, 0029);
- d. Changing the application title from “Fuzzy Audio Wireless Music System” to “Wireless Digital Audio Music System” (EX1005, 0076);
- e. Removing all references to “FAWM” and replacing them with “wireless digital audio music” (EX1005, 0076-84);
- f. Adding new figures 2 and 3 and heavily editing the original figure 2 from the 2003 application into new figure 4 (EX1005, 0086, 0093-95);
- g. Adding a description of a “direct conversion receiver 56” to the specification (EX1005, 0287);
- h. Adding a “direct conversion receiver 56” to figure 3 (EX1005, 0296, 0307); and

- i. Adding a description of a “DPSK (differential phase shift key) transmitter” to the specification (EX1005, 0377).

87. I understand that the examiner objected to many of these amendments as introducing new matter in the disclosure, but allowed others. By the time the 2003 application issued as U.S. Patent No. 7,412,294 (EX1006) on August 12, 2008, the specification and figures were almost completely different from the as-filed 2003 application. EX1010.

3. The 2008 Application

88. The as-filed specification of the '000 patent is substantially the same as the as-filed specification of the 2008 application. EX1011.

VI. TECHNOLOGY BACKGROUND

89. Below I provide a brief overview of the prior art references I discuss in the Grounds.

A. '196 Publication (EX1004)

90. The '196 Publication is U.S. Patent Appl Pub. 2003/0118196, published June 26, 2003. I have been informed that the '196 Publication is prior art. The '196 Publication is in the same field of endeavor as the '000 patent as both are directed to “wireless digital audio systems for transmission of a signal from an audio player device to a headphone.” (EX1004, Abstract; see also EX1001, Abstract (“A wireless digital audio system includes a portable audio source with a digital audio

transmitter operatively coupled thereto and an audio receiver operatively coupled to a headphone set.”)

91. The '196 Publication is generally directed to “wireless digital audio systems for transmission of a signal from an audio player device to a headphone”:

The present invention is directed to wireless digital audio systems for transmission of a signal from an audio player device to a headphone. An audio transmitter may include a headphone plug in communication with an analog low pass filter wherein the headphone plug may be connectable to a headphone jack of an audio source. The low pass filter output signal may be in communication with an A/D converter whose output may be in communication with a digital low pass filter that outputs a signal to an encoder. The encoder output may be in communication with a channel encoder the output of which may be in communication with a block interleaver. The block interleaver output may be in communication with a modulator the output of which may be summed with a transmitter code generator output in a summing element. The modulator may be a 64 Ary modulator. The summing element output may be in communication with a differential phase shift key transmitter the output of which may be in communication with a transmit antenna for wireless transmission of a signal. The transmitted signal may be transmitted to an audio receiver for processing to power a headphone speaker. It is emphasized that this abstract is provided to comply with the rules requiring an abstract that will allow a searcher or other reader to quickly ascertain the subject matter of the technical disclosure. It is submitted with the understanding

that it will not be used to interpret or limit the scope or meaning of the claims.

EX1004, Abstract.

B. Rappaport (EX1018)

92. Rappaport is a book titled “Wireless Communications: Principles & Practice” by Theodore S. Rappaport, which published in 1996. A POSA would have understood that Rappaport was publicly available prior to the filing date of the earliest application to which the ’000 patent claims priority to (December 21, 2001), as evidenced by the following: (1) Rappaport’s copyright page indicates it was copyrighted in 1996, with corrections in 1999, and bears the ISBN number 0-13-375536-3 (EX1018); (2) the Library of Congress includes an entry for Rappaport with the same ISBN number (0-13-375536-3), which confirms that Rappaport was originally “Published: Prentice Hall PTR, Upper Saddle River, N.J., **c1996**” (EX1025, 1); and (3) Rappaport was referenced in U.S. Patent No. 5,933,421, which was filed on February 6, 1997 and issued on August 3, 1998 (EX1026, 1:51-54 (“The technical foundations of these multiple access protocols are discussed in the recent book by Rappaport entitled “Wireless Communications Principles and Practice”, Prentice Hall, **1996**.”). I have been informed that Rappaport is prior art.

93. The “purpose” of Rappaport “is to initiate the newcomer to cellular radio and wireless personal communications.” EX1018, xiii. Rappaport “has been

designed for the student or practicing engineer who is already familiar with technical concepts such as probability, communication theory, and basic electromagnetics.” *Id.* Rappaport “provides extensive coverage of the most common analog and digital modulation techniques used in mobile communications.” *Id.*, xiv. Rappaport is in the same field of endeavor as the ’000 patent because both are directed to wireless personal communication devices.

C. Walley (EX1015)

94. Walley is U.S. Patent No. 6,744,808, which was filed June 3, 1999 and issued June 1, 2004. I have been informed that Walley is prior art. Walley is in the same field of endeavor as the ’000 patent because both are directed to wireless communication devices using spread spectrum techniques which transmit audio, including music.

95. Walley is directed to “generic type spread spectrum controllers which can be used in a variety of applications.” EX1015, Abstract. These controllers address “Problems With the Current Art” relating to the “different requirements” of “wireless communications electronics, such as cordless and cellular telephones, wireless units to transmit music to speakers or headphones, programmable digital assistants and computers with wireless links, pagers, and wireless tracking devices.” EX1015, 2:33-39, 2:66-3:1, 12:15-25. Walley discloses a spread spectrum system (e.g., a CDMA system) that uses a “spreading code[,]” which Walley discloses as a

“a dedicated code that is used to separate that system’s transmissions from all others.” EX1015, 1:27-59. Walley also discloses that the “spreading codes” are “commonly referred to as Pseudo Noise (PN) codes.” EX1015, 1:34-35. Walley teaches that this code can be lengthened to “increase the noise immunity and the transmission range of the signal.” Id., 4:23-25.

D. Miyake (EX1017)

96. Miyake is U.S. Patent No. 5,546,424, which was filed June 27, 1994 and issued August 13, 1996. I have been informed that Miyake is prior art. Miyake is in the same field of endeavor as the ’000 patent because both are directed to spread-spectrum, wireless communication devices.

97. Miyake teaches a “spread spectrum communication system which can simplify the management of users and services.” EX1016, 2:23-26. Miyake describes a “spreading code” based on the output of two different spreading code generators:

[A] spreading code supplied to the mixer 31 is what is obtained by mixing **a spreading code from the first spreading code generator 32, which produces spreading codes specific to individual users, with a spreading code output from the second spreading code generator 33, which produces spreading codes assigned according to the attributes** [of the services].

EX1016, 5:49-56; *see also id.*, 8:12-60.

E. Gibson (EX1022)

98. Gibson is a book titled “The Communications Handbook” by Jerry D. Gibson. This book published in 1997. A POSA would have understood that Gibson was publicly available prior to the filing date of the earliest application to which the ’000 patent claims priority to (December 21, 2001), as evidenced by the following: (1) Gibson’s copyright page indicates it was copyrighted in 1997 and bears the ISBN number 0-8493-8349-8 (EX1022); (2) the Library of Congress includes an entry for Gibson with the same ISBN number (0-8493-8349-8), which confirms that Gibson was “Published: CRC Press ; IEEE Press, Boca Raton, Fla. ; [New York, N.Y.], c1997” (EX1027, 1); and (3) Gibson was referenced in U.S. Patent No. 5,953,669, which was filed on December 11, 1997 and issued on September 14, 1999 (EX1028, 4:60-65 (“General considerations involved in designing a wireless communication system such as a cellular radiotelephone network are described in "The Communications Handbook," Jerry D. Gibson, Editor-in-Chief, CRC Press (1997), Chapter 81, pp. 1146-1159, incorporated herein by reference.”). I have been informed that Gibson is prior art.

99. Gibson is directed to design of communication systems, including wireless systems, and thus is in the same field of endeavor as the ’000 patent. Specifically, Gibson is a handbook which includes “articles or chapters” that are

“written as tutorials or overviews, so that once the reader locates the broader topic, it is easy to find an answer to a specific question.” EX1022, iii. Gibson includes chapters which outline the “Basic Principles” of a communication system, such as Chapter 16: Spread Spectrum Communications and Chapter 21: Digital Modulation Techniques.

F. Drakoulis (EX1021)

100. Drakoulis is U.S. Patent No. 6,256,303, which was filed October 15, 1999 and issued July 3, 2001. I have been informed that Drakoulis is prior art.

101. Drakoulis is directed to an apparatus which “includes a base unit 22 containing a high frequency transmitter and a remote unit 24 which is capable of receiving the high frequency transmitted signal.” EX1021, 5:27-5:33. “[T]he base unit 22 is adapted to be coupled via jacks or connectors and electrical conductors to the signal source 10.” EX1021, 5:34-37; see also *id.*, FIG. 1. Drakoulis teaches that “suitable” “audio sources 10” include “a CD player, AM/FM tuner, tape deck, turntable, etc.” (EX1015, 5:21-25.) Drakoulis further teaches “Although not shown, a stereo mini-input jack and stereo mini-output jack may also be mounted on the housing of the base unit 22 for receiving mini plug connectors attached to cables.” Drakoulis is in the same field of endeavor as the ’000 patent because both are directed to devices for wirelessly transmitting audio from a separate audio device.

VII. CLAIM CONSTRUCTION

102. I understand that, in the Apple Litigation, the district court construed numerous claim terms of two related patents (U.S. Patent Nos. 10,129,627 and 10,468,047) (EX1013 (Apple *Markman* Order)). I further understand that the District Court subsequently applied these claim constructions in granting defendant's motion for summary judgment of noninfringement. (*See, e.g.*, EX1024 at 8). I also understand that the Federal Circuit appellate court affirmed the district court's ruling of summary judgment of non-infringement. (EX1029 at 2, 7). I further understand that, when multiple patents stem from the same parent application and share common terms, those terms should be construed consistently across all such patents.

103. The relevant Apple Litigation claim constructions are summarized in the table below:

Term	Construction
"reduced intersymbol interference coding"	"coding that reduces intersymbol (inter-symbol) interference"
The term "independent" in the context of "configured for independent CDMA communication operation" / "independent" CDMA communication	"performed independent of any central control"

“unique user code”	“fixed code (bit sequence) specifically associated with one user of a device(s)”
“direct conversion module”	“module for converting radio frequency to baseband or very near baseband in a single frequency conversion without an intermediate frequency.”
“audio source”	“a device for providing audio that has an analog headphone jack”
“transmitter”	“a device that can be connected into an analog headphone jack to wirelessly transmit an audio signal”

104. I have adopted the above claim constructions for purposes of my analysis here, and note certain issues that relate to my technical analysis.

VIII. CLAIMS 1-12 ARE UNPATENTABLE

105. I have been asked to provide my opinion as to whether the Challenged Claims of the '000 patent would have been anticipated or obvious in view of the prior art. The discussion below provides a detailed analysis of how the prior art references identified teach the limitations of the Challenged Claims of the '000 patent.

106. As part of my analysis, I have considered the scope and content of the prior art and any differences between the alleged invention and the prior art. I describe in detail below the scope and content of the prior art, as well as any differences between the alleged invention and the prior art, on an element-by-element basis for each Challenged Claims of the '000 patent.

107. As described in detail below, the alleged invention of the Challenged

Claims would have been obvious in view of the teachings of the identified prior art references as well as the knowledge of a POSA.

Grounds	Claim(s)	Basis
1	1-5, 8-12	Rendered obvious by '196-Publication (EX1004) in view of Gibson (EX1022)
2	1-5, 8-10	Rendered obvious by Walley (EX1015) in view of Miyake (EX1016) and Gibson (EX1022)
3	11-12	Rendered obvious by Walley (EX1015) in view of Miyake (EX1016), Gibson (EX1022), and Rappaport (EX1018)
4	1-5, 8-12	Rendered obvious by Walley (EX1015) in view of Miyake (EX1016), Gibson (EX1022), Rappaport (EX1018), and Drakoulis (EX1021)

A. Ground 1: The '196 Publication in View of Gibson Renders Obvious Claims 1-5 and 8-12

1. Overview of the combination; motivation to combine; expectation of success

108. Ground 1 relies on the '196-Publication in view of Gibson.

109. The '196-Publication is directed to “wireless digital audio systems for transmission of a signal from an audio player device to a headphone.” EX1004, Abstract.

110. Although the '196-Publication teaches “a method for down converting the received signal while utilizing timing and synchronization to capture the correct bit sequence” (EX1015, ¶[1004]) it does not expressly disclose the characteristics of the bit sequence, such as how it is organized for transmission.

111. Gibson is a communications handbook which includes “articles or

chapters” that are “written as tutorials or overviews, so that once the reader locates the broader topic, it is easy to find an answer to a specific question.” EX1022, iii, title. Gibson teaches “the seven-layer open system interconnection (OSI) model,” including the use of “packets” to break down a long communication message. EX1022, 182, 567-576.

112. A POSA would have been motivated to use the teachings of the Gibson handbook to provide the implementation details required to create a transmitter and receiver based on the ’196-Publication’s teachings, and would have had a reasonable expectation that applying Gibson’s teachings to the ’196-Publication would be successful because the ’196-Publication is directed to a wireless audio system and Gibson is a communications handbook including details for implementing a wireless system. A POSA would have reasonably expected to succeed in implementing Gibson’s teachings in ’196-Publication’s system because Gibson is a handbook which includes “articles or chapters” that are “written as tutorials or overviews, so that once the reader locates the broader topic, it is easy to find an answer to a specific question.” EX1022, iii.

Challenged Claims

2. Claim 1

[1P] A mobile wireless digital audio receiver, configured to receive a unique user code and an original audio signal representation in the form of packets, said unique user code used to spread a spectrum of said signal and further configured for independent CDMA communication operation, said receiver independent of the operation of another receiver, said mobile wireless digital audio receiver comprising:

113. I understand that this part of the claim is called the preamble. I also understand that there are special rules that apply to whether a preamble of a claim is a limitation or not. I have not been asked to apply those rules in my analysis. Instead, I have been asked to presume that this is a limitation of the claims. I have done so.

114. It is my opinion that '196 Publication in view of Gibson renders obvious the preamble.

a. The '196 Publication teaches a “*mobile wireless digital audio receiver.*”

115. For example, the '196 Publication teaches headphones which receive a wireless digital audio transmission from an audio player device:

The present invention is directed to wireless digital audio systems for transmission of a signal from an audio player device to a headphone. An audio transmitter may include a headphone plug in communication with an analog low pass filter wherein the headphone plug may be connectable to a headphone jack of an audio source. The low pass filter output signal may be in communication with an A/D

converter whose output may be in communication with a digital low pass filter that outputs a signal to an encoder. The encoder output may be in communication with a channel encoder the output of which may be in communication with a block interleaver. The block interleaver output may be in communication with a modulator the output of which may be summed with a transmitter code generator output in a summing element. The modulator may be a 64 QAM modulator. The summing element output may be in communication with a differential phase shift key transmitter the output of which may be in communication with a transmit antenna for wireless transmission of a signal. **The transmitted signal may be transmitted to an audio receiver for processing to power a headphone speaker.** It is emphasized that this abstract is provided to comply with the rules requiring an abstract that will allow a searcher or other reader to quickly ascertain the subject matter of the technical disclosure. It is submitted with the understanding that it will not be used to interpret or limit the scope or meaning of the claims.

EX1004, Abstract.

116. The '196 Publication explains that “audio receiver 50 ... may be a headphone receiver”:

Referring to FIG. 1, a wireless digital audio system 10 may include an audio transmitter 20 connected to an audio player or audio source 80. The audio transmitter 20 may be connected to the audio source 80 headphone jack 82 using a headphone plug 22. The audio transmitter

20 may have a transmitting antenna 24 that may be omni-directional for transmitting an electromagnetic signal to a receiving antenna 52 of **an audio receiver 50 that may be a headphone receiver. The audio receiver 50 may have headphone speakers 54 in headphones 55 for listening to the audio signal.** The audio system 10 may digitize the audio signal and may transmit an electromagnetic signal at 2.4 GHz using approximately 100 milliwatts or less of power.

EX1004, ¶[0011].

117. A POSA would have understood that a wireless headphone would be mobile. Thus, the '196 Publication teaches a *“mobile wireless digital audio receiver”* (“audio receiver 50”).

b. The '196 Publication teaches a *“mobile wireless digital audio receiver configured to receive a unique user code and an original audio signal representation...said unique user code used to further spread a spectrum of said signal.”*

118. Audio transmitter includes “a transmitter code generator 44 signal to produce...a unique codeword that spreads the signal spectrum” of the transmission to audio receiver:

Modulation of the digital signal may be performed using direct sequence spread spectrum communication technology. A 64-Ary modulator 42 may be used for summation at summation element 46 with **a transmitter code generator 44 signal to produce** a high symbol rate, and **a unique codeword that spreads the signal spectrum.** The output of the summation element 46 may then be

communicated to a differential phase shift key (DPSK) transmitter 48 that modulates the digital signal to be transmitted by an omnidirectional transmitting antenna 24 at approximately 2.4 GHz. The transmit power may be limited to 100 milliwatts.

EX1004, ¶[0014].

119. Audio receiver 50 receives the transmission and includes “receiver code generator 60 [that] may contain the same unique code word that was transmitted by the audio transmitter 20 specific to a particular user” to demodulate the transmission:

The transmitted signal from transmit antenna 24 **may be received by receiving antenna 52** and communicated to a wideband band pass filter (BPF) 54. **The received spread spectrum signal may then be communicated to a 2.4 GHz direct conversion receiver 56.** The direct conversion receiver 56 may provide a method for down converting the received signal while utilizing timing and synchronization to capture the correct bit sequence embedded in the received spread spectrum signal. The audio receiver 50 may utilize fuzzy logic (or continuous logic) to optimize performance of the audio receiver 50.

EX1004, ¶[0015].

The receiver code generator 60 may contain the same unique code word that was transmitted by the audio transmitter 20 specific to a particular a user. Other code words from wireless digital audio systems 10 may appear as noise to a particular audio receiver 50. This may also

be true for other device transmitted signals operating in the wireless digital audio system 10 spectrum. This code division multiple access (CDMA) may be used to provide each user independent operation.

EX1004, ¶[0016].

The resulting summed digital signal from receiving summary element 58 may be processed by a 64-Ary demodulator 52 to demodulate the signal elements modulated in the audio transmitter 20. A block de-interleaver 64 may then decode the bits of the digital signal encoded in the block interleaver. Following such, a Viterbi decoder 66 may be used to decode the bits encoded by the channel encoder 38 in the audio transmitter 20. A source decoder 68 may further decode the coding applied by the encoder 36. The resultant processed digital signal may thereby be conditioned to **represent the original signal processed and transmitted by the audio transmitter 20.**

EX1004, ¶[0017].

120. Thus, audio receiver 50 is *configured to receive a unique user code and an original audio signal representation...said unique user code used to further spread a spectrum of said signal.*

c. The '196 Publication teaches a “receiver...further configured for independent CDMA communication operation, said receiver independent of the operation of another receiver”

121. I understand that, during previous claim construction for a related patent, the term “independent” in “independent CDMA” was taken to mean

“performed independent of any central control.” §VII.

122. The '196-Publication teaches that “receiver 50” uses “code division multiple access (CDMA) [which] may be used to provide each user independent operation”:

The receiver code generator 60 may contain the same unique code word that was transmitted by the audio transmitter 20 specific to a particular a user. Other code words from wireless digital audio systems 10 may appear as noise to a particular audio receiver 50. This may also be true for other device transmitted signals operating in the wireless digital audio system 10 spectrum. **This code division multiple access (CDMA) may be used to provide each user independent operation.**

EX1004, ¶[0016].

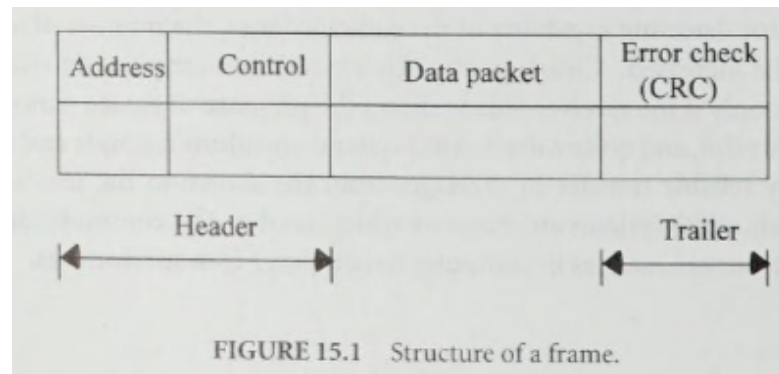
123. The one-to-one relationship between the '196-Publication's receiver and transmitter teaches a *receiver...further configured for independent CDMA communication operation, said receiver independent of the operation of another receiver* as it does not require any centralized control. EX1004, ¶[0016].

d. The '196 Publication in view of Gibson teaches “*an original audio signal representation in the form of packets*”

124. The '196-Publication does not expressly disclose the characteristics of the bit sequence, such as how it is organized for transmission. However, it would have been obvious to a POSA to implement the system described in the '196-

Publication to organize the transmitted bit sequence into blocks of data, such as by portioning the data into packets.

125. First, a POSA would have been familiar with the use of packets in wireless digital communications and the advantages of such use. For example, Gibson teaches “the seven-layer open system interconnection (OSI) model” including a “data link layer, which transforms packets received from the network layer into *frames* by adding address, control and error check fields prior to their transmission.” EX1022, 182. Gibson further teaches the use of “parity check bits” which “allow the receiver to detect and possibly correct errors in the received frames.” *Id.* Gibson depicts an exemplary frame including a “data packet” and “Error Check (CRC)” fields:



EX1022, 182(FIG. 15.1).

126. Gibson teaches that CRC refers to “cyclic redundancy check.” EX1022, 169, 178. Gibson explains that:

Single error checking binary codes can use the syndrome to immediately locate the bit in error. More powerful codes use this information to determine the locations and values of multiple errors.

EX1022, 169.

127. Second, the '196-Publication describes “utilizing timing and synchronization to capture the correct bit sequence embedded in the received spread spectrum signal,” and using a block interleaver 40 and block de-interleaver 46 to reduce errors. EX1004, ¶¶[0015], [0013], [0017]. A POSA would have understood that both timing and synchronization, as well as interleaving and de-interleaving, are typically accomplished using packets, and a POSA would have found it obvious to use packets to implement the system described in the '196-Publication. A POSA would have been motivated to use “packets” and “frames” to partition the '196-Publication’s transmitted audio bit stream as it would allow the receiver to determine whether there was a transmission error, and potentially correct the error.

128. For these reasons, it is my opinion that the '196 Publication in view of Gibson renders obvious a *mobile wireless digital audio receiver* (“audio receiver 50,” which may be a “headphone receiver”), *configured to receive a unique user code* (“unique codeword”) *and an original audio signal representation in the form of packets* (audio bit sequence organized into Gibson’s packets), *said unique user code used to spread a spectrum of said signal and further configured for independent*

CDMA communication operation, said receiver independent of the operation of another receiver.

[1A] a direct conversion module configured to capture packets and a correct bit sequence within the packets aided by lowering signal detection error through reduced intersymbol interference coding of said original audio signal representation, said packets embedded in the received spread spectrum signal, the captured packets corresponding to the unique user code;

129. It is my opinion that the '196 Publication in view of Gibson renders obvious this limitation.

e. The '196 Publication in view of Gibson renders obvious “*a direct conversion module configured to capture packets and a correct bit sequence within the packets ... said packets embedded in the received spread spectrum signal, the captured packets corresponding to the unique user code*”

130. I understand that, during previous claim construction for a related patent, the term “direct conversion module” was construed to mean a “module for converting radio frequency to baseband or very near baseband in a single frequency conversion without an intermediate frequency” and “[reduce/reduction of] intersymbol interference coding” was construed to mean “coding that reduces intersymbol (inter-symbol) interference.” *See* §VII.

131. The '196-Publication teaches “a transmitter code generator 44 signal to produce...a unique codeword that spreads the signal spectrum” of the transmission to audio receiver:

Modulation of the digital signal may be performed using direct sequence spread spectrum communication technology. A 64-Ary modulator 42 may be used for summation at summation element 46 with **a transmitter code generator 44 signal to produce** a high symbol rate, and **a unique codeword that spreads the signal spectrum**. The output of the summation element 46 may then be communicated to **a differential phase shift key (DPSK) transmitter 48** that modulates the digital signal to be transmitted by an omnidirectional transmitting antenna 24 at approximately 2.4 GHz. The transmit power may be limited to 100 milliwatts.

EX1004, ¶[0014].

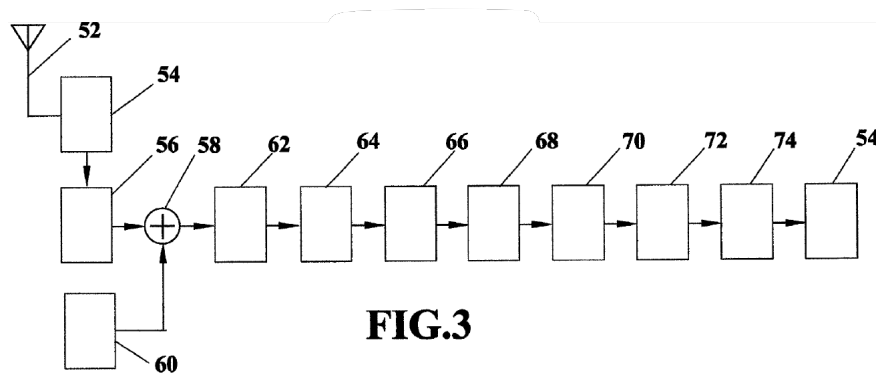
132. The '196-Publication further teaches a “direct conversion receiver 56 [that] may provide a method for down converting the received signal while utilizing timing and synchronization to capture the correct bit sequence embedded in the received spread spectrum signal”:

The transmitted signal from transmit antenna 24 may be received by receiving antenna 52 and communicated to a wideband band pass filter (BPF) 54. The received spread spectrum signal may then be communicated to a 2.4 GHz direct conversion receiver 56. The direct conversion receiver 56 may provide a method for down converting the received signal while utilizing timing and synchronization to capture the correct bit sequence embedded in the received spread spectrum signal. The audio receiver 50 may utilize fuzzy logic (or continuous logic) to optimize performance of the audio receiver 50.

EX1004, ¶[0015].

133. I understand that, in another proceeding, Patent Owner argued that “a POSITA would understand that a ‘direct conversion’ receiver includes near-zero intermediate frequency (NZIF) receivers that convert to very near baseband in a single frequency conversion without an intermediate frequency.” EX1023, 18. I agree that a direct conversion receiver converts a signal to baseband in a single frequency conversion without an intermediate frequency. *See, e.g.*, EX1022, 1322-24.

134. As depicted below “audio receiver 50” includes “direct conversion receiver 56”:



EX1004, FIG. 3, ¶[0009] (“FIG. 3 illustrates a functional block diagram of the audio receiver”).

135. Thus, the ’196-Publication teaches a *direct conversion module* (“direct conversion receiver 56”) *configured to capture...a correct bit sequence within...the received spread spectrum signal...corresponding to the unique user code.*

136. Also, as I discussed above with respect to [1P], a POSA would have found it obvious to use packets in implementing the system of the '196-Publication. See [1P]. Thus, '196-Publication in view of Gibson renders obvious a *direct conversion module* (“direct conversion receiver 56”) *configured to capture packets and a correct bit sequence within the packets...said packets embedded in the received spread spectrum signal, the captured packets corresponding to the unique user code.*

f. The '196 Publication teaches “a *direct conversion module configured to capture...a correct bit sequence within the packets aided by lowering signal detection error through reduced intersymbol interference coding of said original audio signal representation*”

137. Audio transmitter includes “encoder 36...to reduce intersymbol interference (ISI) by using a transform code to encode the digital signal” (*coding that reduces intersymbol (inter-symbol) interference*), which “may lower the probability of signal detection error”:

An encoder 36 may be used to reduce intersymbol interference (ISI) by using a transform code to encode the digital signal. The reduction of ISI may lower the probability of a signal detection error in the audio receiver. The digital signal may next be processed by a channel encoder 38 and a block interleaver 40 to produce encoded redundancies in the transmitted signal to reduce errors that may occur during transmission.

EX1004, ¶[0013].

138. Thus, the '196-Publication in view of Gibson teaches a *direct conversion module configured to capture...a correct bit sequence within the packets aided by lowering signal detection error through reduced intersymbol interference coding of said original audio signal representation.*

[1B] a decoder operative to decode the reduced intersymbol interference coding of said original audio signal representation wherein each user has their audio receiver configured to communicate with their own separate audio transmitter, and said receiver virtually free from interference from transmission and reception device signals operating in the shared spectrum.

139. It is my opinion that the '196 Publication renders obvious this limitation.

140. Audio transmitter includes “encoder 36...to reduce intersymbol interference (ISI) by using a transform code to encode the digital signal” (*coding that reduces intersymbol (inter-symbol) interference*), which “may lower the probability of signal detection error”:

An encoder 36 may be used to reduce intersymbol interference (ISI) by using a transform code to encode the digital signal. The reduction of ISI may lower the probability of a signal detection error in the audio receiver. The digital signal may next be processed by a channel encoder 38 and a block interleaver 40 to produce encoded redundancies in the transmitted signal to reduce errors that may occur during transmission.

EX1004, ¶[0013].

141. Audio receiver 50 comprises “source decoder 68” to “decode the coding applied by the encoder 36” and thus processes the received signal for reduction of ISI:

The resulting summed digital signal from receiving summary element 58 may be processed by a 64-Ary demodulator 62 to demodulate the signal elements modulated in the audio transmitter 20. A block de-interleaver 64 may then decode the bits of the digital signal encoded in the block interleaver 40. Following such, a Viterbi decoder 66 may be used to decode the bits encoded by the channel encoder 38 in the audio transmitter 20. **A source decoder 68 may further decode the coding applied by the encoder 36. The resultant processed digital signal may thereby be condition to represent the original signal** processed and transmitted by the audio transmitter 20.

EX1004., ¶[0017].

142. Thus, the '196-Publication in view of Gibson renders obvious *a decoder (source decoder 68) operative to decode the reduced intersymbol interference coding of said original audio signal representation.*

143. As I explained above with respect to [1P], the '196-Publication teaches a *receiver* which uses a “unique code word that was transmitted by the audio transmitter 20 specific to a particular a user.” EX1004, ¶[0016]. “This code division multiple access (CDMA) may be used to provide each user independent operation.”

Id. Thus, the '196-Publication in view of Gibson renders obvious *wherein each user has their audio receiver configured to communicate with their own separate audio transmitter.*

144. The '196-Publication teaches that the “unique codeword...spreads the signal spectrum.” EX1004, ¶[0014]. The '196 Publication further explains that the spreading provided for by the unique codeword allows a receiver to distinguish between transmissions from different transmitters and explains that other transmissions “may appear as noise”:

The receiver code generator 60 may contain the same unique code word that was transmitted by the audio transmitter 20 specific to a particular a user. Other code words from wireless digital audio systems 10 may appear as noise to a particular audio receiver 50. This may also be true for other device transmitted signals operating in the wireless digital audio system 10 spectrum. This code division multiple access (CDMA) may be used to provide each user independent operation.

EX1004, ¶[0016].

145. Thus, the '196-Publication in view of Gibson renders obvious *said receiver virtually free from interference from transmission and reception device signals operating in the shared spectrum.*

146. Accordingly, the '196-Publication in view of Gibson renders obvious

claim 1.

3. Claim 2

147. Claim 2 largely corresponds to claim 1 as I indicated in the below table, and thus, claim 2 is rendered obvious for the same reasons that I proved above for claim 1 for their matching claims or claim limitations. There is, however, one claim limitation which does not have a corresponding limitation: [2C].

Limitation	Corresponding Limitation
[2P]	[1P]
[2A]	[1A]
[2B]	[1B]

[2C] a digital-to-analog converter generating an audio output of said original audio signal representation...

148. It is my opinion that the '196-Publication in view of Gibson renders obvious this limitation.

149. Audio receiver 50 includes “[a] digital-to-analog converter 70 (DAC) [that] may be used to transform the digital signal to an analog audio signal”:

The next step may process the digital signal to return the signal to analog or base band format for use in powering a speaker 54. A digital-to-analog converter 70 (DAC) may be used to transform the digital signal

to an analog audio signal. An analog low pass filter 72 may be used to filter the analog audio signal to pass a signal in the approximate 20 Hz to 20 kHz frequency range and filter other frequencies. **The analog audio signal may then be processed by a power amplifier 74 that may be optimized for powering a headphone speaker 54 to optimize a high quality, low distortion signal for hearing by a user wearing the headphones 55.**

EX1004, ¶[0018].

150. Thus, it is my opinion that the '196 Publication teaches *a digital-to-analog converter* (“digital-to-analog converter 70”) generating an audio output of said original audio signal representation.

[2D] a module adapted to produce said generated audio output, wherein each user has their audio headphone configured to communicate with their own separate audio transmitter, and said audio virtually free from interference from transmission and reception device signals operating in a shared wireless headphone spectrum.

151. It is my opinion that the '196 Publication in view of Gibson renders obvious this limitation.

152. The '196-Publication teaches that the analog audio output signal from the DAC 70 is provided to an “analog low pass filter 72” and then “power amplifier 74 that may be optimized for powering a headphone speaker 54:

The next step may process the digital signal to return the signal to analog or base band format for use in

powering a speaker 54. A digital-to-analog converter 70 (DAC) may be used to transform the digital signal to an analog audio signal. An analog low pass filter 72 may be used to filter the analog audio signal to pass a signal in the approximate 20 Hz to 20 kHz frequency range and filter other frequencies. The analog audio signal may then be processed by a power amplifier 74 that may be optimized for powering a headphone speaker 54 to optimize a high quality, low distortion signal for hearing by a user wearing the headphones 55.

153. Thus, the '196-Publication in view of Gibson renders obvious *a module adapted to produce said generated audio output.*

154. As I explained above with respect to [1B], the '196-Publication in view of Gibson renders obvious *wherein each user has their audio headphone configured to communicate with their own separate audio transmitter, and said audio virtually free from interference from transmission and reception device signals operating in a shared...spectrum.*

155. The '196-Publication teaches that the “received spread spectrum signal may then be communicated to a 2.4 GHz direct conversion receiver”:

The transmitted signal from transmit antenna 24 may be received by receiving antenna 52 and communicated to a wideband band pass filter (BPF) 54. **The received spread spectrum signal may then be communicated to a 2.4 GHz direct conversion receiver 56. The**

direct conversion receiver 56 may provide a method for down converting the received signal while utilizing timing and synchronization to capture the correct bit sequence embedded in the received spread spectrum signal. The audio receiver 50 may utilize fuzzy logic (or continuous logic) to optimize performance of the audio receiver 50.

EX1004, ¶[0015].

156. Since the '196-Publication teaches wireless headphone receivers ([1P]) using the 2.4 GHz spectrum and a POSA would have understood that the 2.4 GHz spectrum is shared, the '196-Publication in view of Gibson renders obvious *a shared wireless headphone spectrum*.

4. Claim 3

[3P] A wireless digital audio headphone comprising:

157. I understand that this part of the claim is called the preamble. I also understand that there are special rules that apply to whether a preamble of a claim is a limitation or not. I have not been asked to apply those rules in my analysis. Instead, I have been asked to presume that this is a limitation of the claims. I have done so.

158. It is my opinion that '196 Publication in view of Gibson renders obvious the preamble. *See* [1P].

[3A] a digital audio headphone receiver configured to receive an unique user code bit sequence and a [sic] original audio signal representation in the form of packets, said digital audio headphone receiver, capable of mobile operation and configured for direct digital coded wireless spread spectrum communication with a mobile digital audio transmitter, and said user has their headphone configured to communicate with their own transmitter;

159. It is my opinion that the '196-Publication in view of Gibson renders obvious this limitation.

160. The '196-Publication in view of Gibson renders obvious *a digital audio headphone receiver* (headphone receiver 50) *configured to receive an unique user code bit sequence* (unique codeword) *and a [sic] original audio signal representation in the form of packets* (as disclosed in Gibson), *said digital audio headphone receiver, capable of mobile operation. See [1P].*

161. The '196-Publication in view of Gibson teaches an “audio transmitter 20...for transmitting an electromagnetic signal to...an audio receiver 50 that may be a headphone receiver”:

Referring to FIG. 1, **a wireless digital audio system 10 may include an audio transmitter 20** connected to an audio player or audio source 80. The audio transmitter 20 may be connected to the audio source 80 headphone jack 82 using a headphone plug 22. **The audio transmitter 20 may have a transmitting antenna 24 that may be omni-directional for transmitting an electromagnetic signal to a receiving antenna 52 of an audio receiver 50 that may be a headphone receiver.** The audio receiver 50 may have headphone speakers 54 in

headphones 55 for listening to the audio signal. The audio system 10 may digitize the audio signal and may transmit an electromagnetic signal at 2.4 GHz using approximately 100 milliwatts or less of power.

EX1004, ¶[0011].

162. The '196 Publication explains that “audio transmitter 20 may be a compact device that may be connected to the audio source 80”:

Referring to FIG. 2, an audio transmitter 20 may receive an audio signal from an audio source 80. **The audio transmitter 20 may be a compact device that may be connected to the audio source 80 to remain therewith for transmitting a signal to an audio receiver.** An audio source 80 normally provides an analog output signal in the approximate range of 20 Hz to 20 kHz. This signal may then be processed through an analog low pass filter 30 to then be digitized by a 4 bit analog-to-digital (A/D) converter 32. After digital conversion of the analog audio signal, the digital signal may be processed by a digital low pass filter 34 to reduce unwanted out of band noise that may have been produced by the A/D converter 32.

EX1004, ¶[0012]; *see id.*, FIG. 2.

163. A POSA would understand that the compact audio transmitter is mobile because the '196 publication explains that the audio player device, which incorporates the audio transmitter, is mobile:

Use of audio headphones with **audio player devices such as radio, tape players, CD players**, computers, television audio and the like

have been in use for may [sic] years. Such use includes the portable player systems such as cassette tape players that may be used during exercising as for example running. These systems usually incorporate an audio source having a headphone jack to which a headphone is connected by wire and connector.

EX1004, ¶[0002].

164. The '196 Publication explains that the transmitter includes “a transmitter code generator 44 signal to produce...a unique codeword that spreads the signal spectrum” of the transmission to audio receiver:

A Modulation of the digital signal may be performed using direct sequence spread spectrum communication technology. A 64- Ary modulator 42 may be used for summation at summation element 46 with **a transmitter code generator 44 signal to produce** a high symbol rate, and **a unique codeword that spreads the signal spectrum.** The output of the summation element 46 may then be communicated to a differential phase shift key (DPSK) transmitter 48 that modulates the digital signal to be transmitted by an omni-directional transmitting antenna 24 at approximately 2.4 GHz. The transmit power may be limited to 100 milliwatts.

EX1004, ¶[0014].

165. The “spread spectrum signal” transmitted from “audio transmitter 20” is received by the “direct conversion receiver 56” of the receiver:

The transmitted signal from transmit antenna 24 may be received by receiving antenna 52 and communicated to a wideband band pass filter (BPF) 54. The received spread spectrum signal may then be communicated to a 2.4 GHz direct conversion receiver 56. The direct conversion receiver 56 may provide a method for down converting the received signal while utilizing timing and synchronization to capture the correct bit sequence embedded in the received spread spectrum signal. The audio receiver 50 may utilize fuzzy logic (or continuous logic) to optimize performance of the audio receiver 50.

EX1004, ¶[0015].

166. Thus, the '196-Publication in view of Gibson renders obvious *configured for direct digital coded wireless spread spectrum communication with a mobile digital audio transmitter* (the “compact” audio transmitter 20).

167. As I explained above with respect to [1P], the '196-Publication teaches a *headphone receiver* which uses a “unique code word that was transmitted by the audio transmitter 20 specific to a particular a user.” EX1004, ¶[0016]. The '196 Publication explains that “[t]his code division multiple access (CDMA) may be used to provide each user independent operation.” *Id.* Thus, the '196-Publication in view of Gibson renders obvious *said user has their headphone configured to communicate with their own transmitter.*

[3B] a direct conversion module configured to capture packets and the correct bit sequence within the packets aided by lowering signal detection error through reduced intersymbol interference coding of said original audio signal representation said packets embedded in the received spread spectrum signal, the captured packets corresponding to the unique user code;

168. It is my opinion that the '196-Publication in view of Gibson renders obvious this limitation. *See* [1A].

[3C] a digital demodulator configured for independent CDMA communication operation wherein a user has their own transmitter and receiver;

169. It is my opinion that the '196-Publication in view of Gibson renders obvious this limitation.

170. I understand that, during previous claim construction for a related patent, the term “independent” in “independent CDMA” was taken to mean “performed independent of any central control.” §VII.

171. The '196-Publication teaches that the signal received by the direct conversion receiver is demodulated using the “same unique code word that was transmitted by the audio transmitter 20”:

The down converted output signal of the direct conversion receiver 56 may be summed in receiver summing element 58 with a receiver code generator 60 signal. The receiver code generator 60 may contain the same unique code word that was transmitted by the audio transmitter 20 specific to a particular a user. Other code words from wireless digital audio systems 10 may appear as noise to a

particular audio receiver 50. This may also be true for other device transmitted signals operating in the wireless digital audio system 10 spectrum. **This code division multiple access (CDMA) may be used to provide each user independent operation.**

EX1004, ¶[0016].

172. After the CDMA demodulation above, the “resulting summed digital signal from receiving summary element 58 may be processed by a 64-Ary demodulator 62 to demodulate the signal elements modulated in the audio transmitter 20”:

The resulting summed digital signal from receiving summary element 58 may be processed by a 64-Ary demodulator 62 to demodulate the signal elements modulated in the audio transmitter 20. A block de-interleaver 64 may then decode the bits of the digital signal encoded in the block interleaver 40. Following such, a Viterbi decoder 66 may be used to decode the bits encoded by the channel encoder 38 in the audio transmitter 20. A source decoder 68 may further decode the coding applied by the encoder 36. The resultant processed digital signal may thereby be condition to represent the original signal processed and transmitted by the audio transmitter 20.

EX1004., ¶[0017].

173. Thus, the '196-Publication in view of Gibson renders obvious *a digital demodulator* (receiver summing element 58, receiver code generator 60, and/or

demodulator 62) *configured for...CDMA communication operation wherein a user has their own transmitter and receiver*. The one-to-one relationship between the '196-Publication's receiver and transmitter teaches *independent CDMA communication operation* as it does not require any centralized control. EX1004, ¶[0016].

[3D] a decoder operative to decode the reduced intersymbol interference coding of original audio signal representation;

174. It is my opinion that the '196-Publication in view of Gibson renders obvious this limitation. *See* [1B].

[3E] a digital-to-analog converter (DAC) generating an audio output of said original audio signal representation; and

175. It is my opinion that the '196-Publication in view of Gibson renders obvious this limitation. *See* [2C].

[3F] a module responsive to the unique user code bit sequence to produce said generated audio output wherein each user has their audio headphone configured to communicate with their own separate audio transmitter, said output virtually free from interference from transmission and reception device signals operating in the shared wireless headphone spectrum.

176. It is my opinion that the '196-Publication in view of Gibson renders obvious this limitation.

177. As I explained above with respect to [3C], the '196-Publication teaches the use of a “unique code word” (*unique user code bit sequence*) to demodulate a received spread spectrum signal.

178. The demodulated signal is then decoded “to represent the original signal”:

The resulting summed digital signal from receiving summary element 58 may be processed by a 64-Ary demodulator 62 to demodulate the signal elements modulated in the audio transmitter 20. A block de-interleaver 64 **may then decode the bits of the digital signal** encoded in the block interleaver 40. Following such, **a Viterbi decoder 66 may be used to decode the bits** encoded by the channel encoder 38 in the audio transmitter 20. **A source decoder 68 may further decode the coding applied by the encoder 36. The resultant processed digital signal may thereby be condition to represent the original signal** processed and transmitted by the audio transmitter 20.

EX1004., ¶[0017].

179. As I explained above with respect to [2C], the decoded signal is then converted to an analog signal by “digital-to-analog converter 70” (*see* [2C]).

180. The analog signal is provided to an “analog low pass filter 72” and then “power amplifier 74 that may be optimized for powering a headphone speaker 54”:

The next step may process the digital signal to return the signal to analog or base band format for use in powering a speaker 54. A digital-to-analog converter 70 (DAC) may be used to transform the digital signal to an analog audio signal. **An analog low pass filter 72 may be used to filter the analog audio signal** to pass a signal in the

approximate 20 Hz to 20 kHz frequency range and filter other frequencies. **The analog audio signal may then be processed by a power amplifier 74 that may be optimized for powering a headphone speaker 54 to optimize a high quality, low distortion signal for hearing by a user wearing the headphones 55.**

EX1004, ¶[0018].

181. Thus, the '196-Publication in view of Gibson renders obvious *module responsive to the unique user code bit sequence to produce said generated audio output.*

182. The '196-Publication in view of Gibson renders obvious *wherein each user has their audio headphone configured to communicate with their own separate audio transmitter, said output virtually free from interference from transmission and reception device signals operating in the shared wireless headphone spectrum. See [1B].*

5. Claim 4.

Claim 4. The wireless digital audio headphone of claim 3, wherein the audio output is music.

183. It is my opinion that the '196-Publication in view of Gibson renders obvious this claim.

184. The '196 Publication teaches a “connection system for existing audio player devices,” “such as radio, tape players, [and] CD players.” EX1004, ¶[0002],

[0004] and explains that “cassette tape players ... may be used during exercising”:

Use of audio headphones with **audio player devices such as radio, tape players, CD players**, computers, television audio and the like **have been in use for may [sic] years. Such use includes the portable player systems such as cassette tape players that may be used during exercising as for example running.** These systems usually incorporate an audio source having a headphone jack to which a headphone is connected by wire and connector.

EX1004, ¶[0002].

As can be seen, there is a need for a simple **connection system for existing audio player devices** to allow wireless transmission to a headphone receiver.

EX1004, ¶[0004].

185. A POSA would have understood that radio, cassette players and CD players are generally used to play music. A POSA would have further understood that cassette players used while exercising, such as when running, are typically used to play music. A POSA would have understood that radio, tape players, and CD players provide audio signal representations that represent music.

6. Claim 5

186. Claim 5 largely corresponds to Claims 1 and 2 as I indicated in the below table, and thus, claim 5 is rendered obvious for the same reasons that I proved

above for claims 1 and 2 for their matching claims or claim limitations:

Limitation	Corresponding Limitation
[5P]	[1P]
[5A]	[1A]
[5B]	[1B]
[5C]	[2C]
[5D]	[2D]

7. Claim 8

[8P] A wireless digital coded music audio spread spectrum transmitter operatively coupled to a music audio source and configured to transmit a unique user code and an original audio signal representation in the form of packets, wherein said digital coded music audio transmitter coupled to said music audio source, and configured to be directly communicable with a mobile digital audio spread spectrum receiver, is capable of being moved in any direction during operation, said wireless digital coded audio transmitter comprising:

187. I understand that this part of the claim is called the preamble. I also understand that there are special rules that apply to whether a preamble of a claim is a limitation or not. I have not been asked to apply those rules in my analysis. Instead, I have been asked to presume that this is a limitation of the claims. I have done so.

188. It is my opinion that '196 Publication in view of Gibson renders obvious the preamble.

189. The '196-Publication teaches "wireless digital audio systems for

transmission of a signal from an audio player to a headphone”:

The present invention is directed to wireless digital audio systems for transmission of a signal from an audio player device to a headphone. An audio transmitter may include a headphone plug in communication with an analog low pass filter wherein the headphone plug may be connectable to a headphone jack of an audio source. The low pass filter output signal may be in communication with an A/D converter whose output may be in communication with a digital low pass filter that outputs a signal to an encoder. The encoder output may be in communication with a channel encoder the output of which may be in communication with a block interleaver. The block interleaver output may be in communication with a modulator the output of which may be summed with a transmitter code generator output in a summing element. The modulator may be a 64 Ary modulator. The summing element output may be in communication with a differential phase shift key transmitter the output of which may be in communication with a transmit antenna for wireless transmission of a signal. **The transmitted signal may be transmitted to an audio receiver for processing to power a headphone speaker.** It is emphasized that this abstract is provided to comply with the rules requiring an abstract that will allow a searcher or other reader to quickly ascertain the subject matter of the technical disclosure. It is submitted with the understanding that it will not be used to interpret or limit the scope or meaning of the claims.

EX1004, Abstract.

190. “[A]udio receiver 50...may be a headphone receiver” and is thus a *mobile digital audio...receiver*:

Referring to FIG. 1, a wireless digital audio system 10 may include an audio transmitter 20 connected to an audio player or audio source 80. The audio transmitter 20 may be connected to the audio source 80 headphone jack 82 using a headphone plug 22. The audio transmitter 20 may have a transmitting antenna 24 that may be omni-directional for transmitting an **electromagnetic signal to a receiving antenna 52 of an audio receiver 50 that may be a headphone receiver. The audio receiver 50 may have headphone speakers 54 in headphones 55 for listening to the audio signal.** The audio system 10 may digitize the audio signal and may transmit an electromagnetic signal at 2.4 GHz using approximately 100 milliwatts or less of power.

EX1004, ¶[0011]; *see also id.*, Fig. 1.

191. The ’196 Publication explains that “audio transmitter 20 may be a compact device that may be connected to the audio source 80”:

Referring to FIG. 2, an audio transmitter 20 may receive an audio signal from an audio source 80. **The audio transmitter 20 may be a compact device that may be connected to the audio source 80 to remain therewith for transmitting a signal to an audio receiver.** An audio source 80 normally provides an analog output signal in the approximate range of 20 Hz to 20 kHz. This signal may then be processed through an analog low pass filter 30 to then be digitized by a 4 bit analog-to-digital (A/D) converter 32. After digital conversion of the analog audio

signal, the digital signal may be processed by a digital low pass filter 34 to reduce unwanted out of band noise that may have been produced by the A/D converter 32.

EX1004, ¶[0012]; *see id.*, FIG. 2.

192. I understand that, during previous claim construction for a related patent, the term “transmitter” was construed to mean “a device that can be connected into an analog headphone jack to wirelessly transmit an audio signal” and the term “audio source” was construed to mean “a device for providing audio that has an analog headphone jack.” §VII.

193. Thus, the ’196-Publication teaches a *wireless digital coded...audio transmitter* (“audio transmitter 20”) *operatively coupled to [an] audio source* (“audio source 80”).

194. A POSA would have understood that the transmitter is *capable of being moved in any direction during operation* since it is “compact” and configured for “wireless transmission of a signal to a receiving headphone.” EX1004, ¶¶[0001], [0012].

195. The ’196-Publication describes a “connection system for existing audio player devices,” “such as radio, tape players, [and] CD players.” EX1004, ¶¶[0002], [0004]. “[C]assette tape players ... may be used during exercising.” A POSA would thus have understood that the ’196-Publication teaches or suggests that “audio

source 80” is a *music audio source* and “audio transmitter 20” is a *music audio transmitter*.

196. The ’196 Publication further teaches an audio transmitter which includes “a transmitter code generator 44 signal to produce...a unique codeword that spreads the signal spectrum” of the transmission to audio receiver, and an receiver which includes “receiver code generator 60 [that] may contain the same unique code word that was transmitted by the audio transmitter 20 specific to a particular a user” to demodulate the transmission. EX1004, ¶¶[0014]-[0015]. Thus, the ’196-Publication teaches a *spread spectrum transmitter* (audio transmitter 20)...*configured to transmit a unique user code* (unique code word) *and an original audio signal representation* (music audio).

197. The ’196-Publication teaches that “audio transmitter 20 may have a transmitting antenna 24 that may be omni-directional for transmitting an electromagnetic signal to a receiving antenna 52 of an audio receiver 50.” EX1004, ¶[0011]. Thus, ’196-Publication teaches that “audio transmitter 20” is *configured to be directly communicable with a mobile digital audio spread spectrum*.

198. Also, as I discussed above with respect to [1P], a POSA would have found it obvious to use packets from Gibson in implementing the system of the ’196-Publication. *See* [1P].

199. Thus ’196 in view of Gibson renders obvious *a wireless digital coded*

music audio spread spectrum transmitter operatively coupled to a music audio source and configured to transmit a unique user code and an original audio signal representation in the form of packets, wherein said digital coded music audio transmitter coupled to said music audio source, and configured to be directly communicable with a mobile digital audio spread spectrum receiver, is capable of being moved in any direction during operation, said wireless digital coded audio transmitter comprising:.

[8A] encoding operative to encode said original audio signal representation to reduce intersymbol interference and aid in lowering signal detection error of said audio representation signal respective to said receiver and mobile said transmitter coupled to said music audio source;

200. It is my opinion that the '196 Publication in view of Gibson renders obvious this limitation.

201. I understand that, during previous claim construction for a related patent, the term “[reduce/reduction of] intersymbol interference coding” was construed to mean “coding that reduces intersymbol (inter-symbol) interference.” *See* §VII.

202. The '196-Publication teaches that the audio transmitter includes “encoder 36...to reduce intersymbol interference (ISI) by using a transform code to encode the digital signal” (*coding that reduces intersymbol (inter-symbol) interference*), which “may lower the probability of signal detection error”:

An encoder 36 may be used to reduce intersymbol interference (ISI) by using a transform code to encode the digital signal. The reduction of ISI may lower the probability of a signal detection error in the audio receiver. The digital signal may next be processed by a channel encoder 38 and a block interleaver 40 to produce encoded redundancies in the transmitted signal to reduce errors that may occur during transmission.

EX1004, ¶[0013].

203. Thus, the '196-Publication in view of Gibson renders *encoding operative to encode said original audio signal representation to reduce intersymbol interference and aid in lowering signal detection error of said audio representation signal respective to said receiver and mobile said transmitter coupled to said music audio source.*

[8B] a digital modulator module configured for independent code division multiple access communication operation, wherein each user has their own separate transmitter configured to communicate with their receiver, said transmitter configured to wirelessly transmit said audio to be reproduced virtually free from interference from transmission and reception device signals operating in the wireless digital audio transmitter shared spectrum.

204. It is my opinion that the '196 Publication in view of Gibson renders obvious this limitation.

205. The '196-Publication teaches that the “[m]odulation of the digital signal may be performed using direct sequence spread spectrum communication technology” and explains that a “64-Ary modulator 42 may be used for summation

at summation element 46 with a transmitter code generator 44 signal to produce a high symbol rate, and a unique codeword that spreads the signal spectrum”:

Modulation of the digital signal may be performed using direct sequence spread spectrum communication technology. A 64-Ary modulator 42 may be used for summation at summation element 46 with a transmitter code generator 44 signal to produce a high symbol rate, and a unique codeword that spreads the signal spectrum. The output of the summation element 46 may then be communicated to a differential phase shift key (DPSK) transmitter 48 that modulates the digital signal to be transmitted by an omnidirectional transmitting antenna 24 at approximately 2.4 GHz. The transmit power may be limited to 100 milliwatts.

EX1004, ¶[0014].

206. As stated above, “[t]he output of the summation element 46 may then be communicated to a differential phase shift key (DPSK) transmitter 48 that modulates the digital signal to be transmitted.” *Id.* Thus, the ’196-Publication teaches *a digital modulator module* (modulators 42 and/or 48)

207. I understand that, during previous claim construction for a related patent, the term “independent” in “independent CDMA” was taken to mean “performed independent of any central control.” §VII.

208. The ’196-Publication teaches that “receiver 50” uses “code division multiple access (CDMA) [which] may be used to provide each user independent

operation”:

The receiver code generator 60 may contain the same unique code word that was transmitted by the audio transmitter 20 specific to a particular a user. Other code words from wireless digital audio systems 10 may appear as noise to a particular audio receiver 50. This may also be true for other device transmitted signals operating in the wireless digital audio system 10 spectrum. **This code division multiple access (CDMA) may be used to provide each user independent operation.**

EX1004, ¶[0016].

209. The one-to-one relationship between the '196-Publication's receiver and transmitter teaches a *modulator module configured for independent code division multiple access communication operation* as it does not require any centralized control. EX1004, ¶[0016].

210. As I explained above with respect to [1B], the '196-Publication in view of Gibson renders obvious *each user has their audio receiver configured to communicate with their own separate audio transmitter, and said receiver virtually free from interference from transmission and reception device signals operating in the shared spectrum*. As I reflected with corresponding annotations (red, green, blue) above and below, [8B] recites essentially the same limitations, and thus, the '196-Publication in view of Gibson renders obvious the remainder of limitations in [8B] ,

namely *each user has their own separate transmitter configured to communicate with their receiver, said transmitter configured to wirelessly transmit said audio to be reproduced virtually free from interference from transmission and reception device signals operating in the wireless digital audio transmitter shared spectrum.*

8. Claim 9

211. Claim 9 largely corresponds to Claim 1 as I indicated in the below table, and thus, claim 9 is rendered obvious for the same reasons that I proved above for claim 1 for their matching claims or claim limitations:

Limitation	Corresponding Limitation
[9A]	[1A]
[9B]	[1B]

[9P] A mobile wireless digital audio receiver capable of being moved in any direction during operation and configured to receive a unique user code and an original audio signal representation in the form of packets, said unique user code used to spread a spectrum of said signal and further configured for independent CDMA communication operation, said receiver independent of the operation of another receiver, said wireless digital audio receiver comprising:

212. I understand that this part of the claim is called the preamble. I also understand that there are special rules that apply to whether a preamble of a claim is a limitation or not. I have not been asked to apply those rules in my analysis. Instead, I have been asked to presume that this is a limitation of the claims. I have done so.

213. It is my opinion that the '196 Publication renders obvious the preamble.

214. The '196-Publication in view of Gibson renders obvious *a mobile wireless digital audio receiver...configured to receive a unique user code and an original audio signal representation in the form of packets, said unique user code used to spread a spectrum of said signal and further configured for independent CDMA communication operation, said receiver independent of the operation of another receiver. See [1P].*

215. The '196 Publication teaches that “audio receiver 50...may be a headphone receiver” and thus is *capable of being moved in any direction during operation*. EX1014, ¶[0011]; *see also id.*, Fig. 1.

9. Claim 10

216. Claim 10 largely corresponds to Claim 8 as I indicated in the below table, and thus, claim 10 is rendered obvious for the same reasons that I proved above for claim 8 for their matching claims or claim limitations:

Limitation	Corresponding Limitation
[10P]	[8P]
[10A]	[8A]
[10B]	[8B]

217. Notably, claim 8 requires a “music audio source” while claim 10 more

broadly requires an “audio source.”

10. Claim 11

Claim 11. The wireless digital audio receiver of claim 8, wherein the spread spectrum receiver module is further configured to utilize differential phase shift keying (DPSK) to demodulate said audio signal representation.

218. It is my opinion that the '196-Publication in view of Gibson renders obvious this limitation.

219. Claim 8 does not recite a *spread spectrum receiver module*. For purposes of this IPR, I assume that *spread spectrum receiver module* refers to the *mobile digital audio spread spectrum receiver* of claim 8.

220. As I explained with respect to [8B], the transmitter includes “a differential phase shift key (DPSK) transmitter 48 that modulates the digital signal to be transmitted.” EX1004, ¶[0014].

221. While the '196-Publication does not expressly recite the use of a DPSK demodulator in the audio receiver, the '196-Publication teaches an audio receiver which receives and processes the transmitted signal through a wideband band pass filter 54, direct conversion receiver 56 and a receiver summing element 58:

The transmitted signal from transmit antenna 24 may be received by receiving antenna 52 and communicated to a wideband band pass filter (BPF) 54. The received spread spectrum signal may then be communicated to a 2.4 GHz direct conversion receiver 56. The direct conversion receiver 56 may provide a method for down

converting the received signal while utilizing timing and synchronization to capture the correct bit sequence embedded in the received spread spectrum signal. The audio receiver 50 may utilize fuzzy logic (or continuous logic) to optimize performance of the audio receiver 50.

EX1004, ¶[0015].

The down converted output signal of the direct conversion receiver 56 may be summed in receiver summing element 58 with a receiver code generator 60 signal. The receiver code generator 60 may contain the same unique code word that was transmitted by the audio transmitter 20 specific to a particular a user. Other code words from wireless digital audio systems 10 may appear as noise to a particular audio receiver 50. This may also be true for other device transmitted signals operating in the wireless digital audio system 10 spectrum. This code division multiple access (CDMA) may be used to provide each user independent operation.

EX1004, ¶[0016].

The resulting summed digital signal from receiving summary element 58 may be processed by a 64-Ary demodulator 62 to demodulate the signal elements modulated in the audio transmitter20. A block de-interleaver 64 may then decode the bits of the digital signal encoded in the block interleaver 40. Following such, a Viterbi decoder 66 may be used to decode the bits encoded by the channel encoder 38 in the audio transmitter 20. A source decoder 68

may further decode the coding applied by the encoder 36. The resultant processed digital signal may thereby be condition to represent the original signal processed and transmitted by the audio transmitter 20.

EX1004, ¶[0017].

222. A POSA would have understood a signal modulated with DPSK would need to be demodulated with DPSK in order to return the original signal. So although the '196 Publication's specification indicates the demodulation is conducted by a 64-Ary demodulator, if the original signal was modulated with DPSK the demodulator would need to use DPSK to return a representation of the original signal.

11. Claim 12

Claim 12. The wireless digital audio receiver of claim 10, wherein the spread spectrum receiver module is further configured to utilize differential phase shift keying (DPSK) to demodulate said audio signal representation.

223. It is my opinion that the '196-Publication in view of Gibson renders obvious this claim. *See* claim 11.

B. Ground 2: Walley in view of Miyake and Gibson Renders Obvious Claims 1-5, 8-10

1. Overview of the combination; motivation to combine; expectation of success

224. Ground 2 relies on Walley in view of Miyake and Gibson.

225. I understand that, in another proceeding, Patent Owner argued proposed

claims constructions for the terms “transmitter” and “audio source” (i.e., plain and ordinary meaning). Ex1023, 4-9. I understand that Petitioner disagrees with those proposed constructions. However, for the purposes of Ground 2 herein, I apply Patent Owner’s constructions for these terms to illustrate that, even under Patent Owner’s proposed constructions, the challenged claims are obvious in view of the cited prior art.

226. Walley is directed to “generic type spread spectrum controllers” which address “Problems With the Current Art” relating to the “different requirements” of “wireless communications electronics, such as cordless and cellular telephones, wireless units to transmit music to speakers or headphones, programmable digital assistants and computers with wireless links, pagers, and wireless tracking devices.” EX1015, Abstract, 2:33-39, 2:66-3:1, 12:15-25. Walley discloses a “variable length [Pseudo Noise (JPN)] code controller” which “can supply PN codes of varying lengths to the transmit controller.” EX1015, 9:4-8. Walley explains that “the PN code length might be increased” to “increase the transmit range or to overcome interference or jamming.” EX1015, 8:39-43.

227. Miyake describes a “spread spectrum communication system which can simplify the management of users and services” by assigning “user-specific” spreading codes. EX1016, 2:23-26, 5:49-56, 8:12-60.

228. A POSA would be motivated to combine the spreading process of

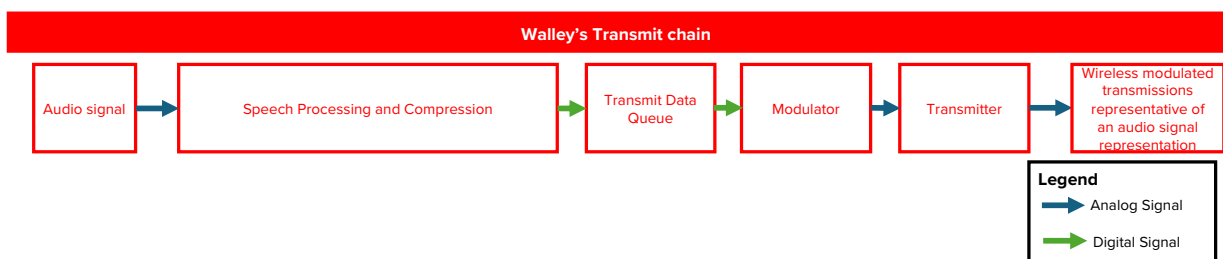
Walley with Miyake's spreading process because it would combine Walley's adjustable system PN code (which can be lengthened to reduce interference) with Miyake's user-specific spreading code to provide a spreading process which creates user-specific spreading codes that can be lengthened to reduce interference.

229. This combination would involve the use of Miyake's known spreading process to improve Walley's similar spread spectrum system to provide user-specific spreading codes to tailor transmissions based on user preferences. For example, Walley explains that "the clarity and fidelity of sound in a portable phone may be an important consideration but, as the signal starts to fade, a user may willingly accept a somewhat lower fidelity in order to have an increased range." EX1015, 3:22-26. A POSA would understand that user-specific spreading codes would allow the system to identify users that are willing to accept a lower fidelity in exchange for an increased range (or vice versa). In addition, this combination would be a simple substitution of one known element (Walley's adjustable system-based spreading code) for another (Miyake's user-specific spreading code) to obtain predictable results (a user-specific spreading code adjustable to reduce interference).

230. A POSA would have reasonably expected to succeed in using Miyake's user-specific spreading code in Walley's adjustable system because Miyake describes using such spreading codes in the context of a spread spectrum system like Walley's and a POSA would have understood that implementing spreading codes on

a user-basis (Miyake) instead of on a system-basis (Walley) would have only required routine knowledge as user accounts and user-specific systems were well-known, and Miyake describes its spread spectrum system as something “which can be designed easily.” EX1016, 2:23-26.

231. Walley describes at a high level a CDMA spread spectrum controller suitable for a range of devices, forgoing unnecessary details of the physical structure of the devices or certain technical details about the individual steps in the processing of the audio signal. Rather Walley combines the steps of audio signal processing (such as analog low pass filtering, AD converting, digital low pass filtering, encoding, channel encoding, interleaving) into a “speech processing and compression” block and indicates that the signal is modulated, then the modulated signal is multiplied by a PN code prior to transmission. Walley does not constrain the specific form of modulation that is used.

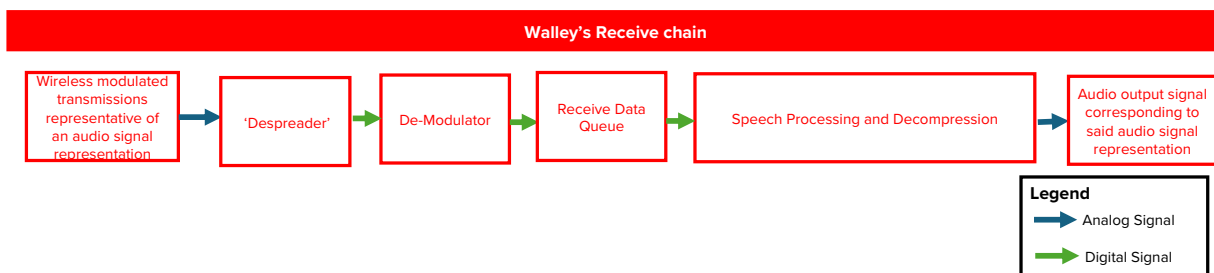


Depiction of Walley's transmit chain²

² Speech Processing and Compression in Walley encompasses all the following functions from the '000 Patent: analog low pass filter, AD converter, digital low

232. Walley also forgoes unnecessary details of how the reciprocal process is carried out at the receiver. Rather Walley specifies that the “despreader” is responsible for performing conversion of the received wireless modulated transmission signal to separate out the original data encoded with the unique user code, as for example a direct conversion receiver does. Walley describes the sequence of steps that takes place in the transmit chain, and the receiver performs the reciprocal steps in the receive chain. In Walley’s receive chain, the wireless modulated transmissions representative of an audio signal representation is received and undergoes ‘despreading’ and demodulation, then the demodulated, digitized signal is sent to a receive data queue prior to undergoing the processes included in speech processing and decompression block (such as de-interleaving, Viterbi decoding, source decoding, DAC, analog low pass filtering, and power amplifying) after which it is transmitted as an audio output signal corresponding to said audio signal representation.

pass filter, encoder, channel encoder, and interleaver (which are described in V.B.1.a.-f.). Walley’s Modulator has the same function as the Modulator of the ‘000 Patent (which is described in V.B.1.g.). The transmitter in Walley conducts the same functions as the code generator and the DPSK transmitter in the ‘000 Patent (which is described in V.B.1.h. and i.).



Depiction of Walley's receive chain³

233. Gibson is a communications handbook which includes “articles or chapters” that are “written as tutorials or overviews, so that once the reader locates the broader topic, it is easy to find an answer to a specific question.” EX1022, iii, title. A POSA would have been motivated to use the teachings of Gibson to provide the implementation details required to create a transmitter and receiver based on Gibson’s teachings, and would have had a reasonable expectation that applying

³ The “Despreader” in Walley conducts the same functions as the code generator and the Direct Conversion Receiver in the ’000 Patent (which is described in V.B.2.a. and b.). Walley’s Demodulator has the same function as the Demodulator of the ’000 Patent (which is described in V.B.2.c.). Speech Processing and Decompression in Walley encompasses all the following functions from the ’000 Patent: de-interleaver, Viterbi decoder, source decoder, DAC, analog low pass filter, power amplifier, headphone speaker (which are described in V.B.2.d.-j.).

Gibson's teachings to Walley would be successful.

Challenged Claims

2. Claim 1

[1P] A mobile wireless digital audio receiver, configured to receive a unique user code and an original audio signal representation in the form of packets, said unique user code used to spread a spectrum of said signal and further configured for independent CDMA communication operation, said receiver independent of the operation of another receiver, said mobile wireless digital audio receiver comprising:

234. I understand that this part of the claim is called the preamble. I also understand that there are special rules that apply to whether a preamble of a claim is a limitation or not. I have not been asked to apply those rules in my analysis. Instead, I have been asked to presume that this is a limitation of the claims. I have done so.

235. It is my opinion that Walley in view of Miyake and Gibson renders obvious the preamble.

a. Walley teaches a “*mobile wireless digital audio receiver*”

236. It is my opinion that Walley teaches *a mobile wireless digital audio receiver* (phones, speakers or headphones). For example, Walley teaches “generic type **spread spectrum** controllers which can be used in a variety of applications” which are intended to address “Problems With the Current Art” relating to the “different requirements” of “wireless communications electronics, such as **cordless and cellular telephones, wireless units to transmit music to speakers or**

headphones, programmable digital assistants and computers with wireless links, pagers, and wireless tracking devices”:

Spread spectrum technology is being used in more and more wireless applications. Generally applications of spread spectrum include a fixed spread spectrum code size. In addition in applications that employ time domain duplex, some may employ a fixed duty cycle, for example 50% broadcast and 50% receive, for broadcast and receive functions. Many applications, such as cordless phones, also feature a fixed sampling rate for an input signal. **By building systems in which these variables are not fixed but variable manufacturers can make generic type spread spectrum controllers which can be used in a variety of applications. These same circuits can also be controlled to give current devices enhanced characteristics by adjusting data rate for changing conditions, thereby enhancing their performance.** By allowing the spreading code to be reduced in length, the data rate of the transmitted signal can be increased without adjusting the bandwidth of the amplifiers used to amplify the transmitted signal. Similarly, more data can be transmitted or spreading code size increased by increasing the transmit duty cycle or the number of timeslices allotted to transmit the signal. The spreading code size can also be increased by using techniques, such as reduced sampling rate, which reduce the amount of data input into the system. Conversely the spreading code length can be increased in order to achieve more range, greater interference tolerance etc. by reducing the data rate or increasing the amount of time allotted to broadcast the signal.

EX1015, Abstract.

Problems Within the Current Art

As popularity increases for wireless communications electronics, such as **cordless and cellular telephones, wireless units to transmit music to speakers or headphones**, programmable digital assistants and computers with wireless links, pagers, and wireless tracking devices, the demand for cheaper, higher performance devices also increases.

EX1015, 2:33-39.

One of the difficulties of providing a circuit that can serve in many applications is that different applications **can have different requirements**.

EX1015, 2:66-3:1.

Another embodiment of the system comprises a set of wireless speakers. In the case of wireless speakers, there would be transmission in only one direction so the transmit (from the base unit) duty cycle would be maximized. Also, the maximum frequency that would be delivered to the speaker would be known. The maximum spreading code size could then be chosen that was consistent with the data rate to be delivered to the speaker. This code might change size depending whether the speaker system was monophonic, stereo, or a surround sound system.

EX1015, 12:15-25.

b. Walley in view of Miyake renders obvious a “receiver, configured to receive a unique user code and an original audio signal representation...said unique user code used to spread a spectrum of said signal”

237. I understand that, during previous claim construction for a related patent, the term “unique user code” was construed to mean a “fixed code (bit sequence) specifically associated with one user of a device(s).”

238. As I explain below, Walley teaches a *spread spectrum audio receiver* (telephone, speaker or headphones) *configured to receive and store a ... code* (spreading code).

239. Walley teaches a spread spectrum system (e.g., a CDMA system) that uses a “spreading code[],” which Walley describes as a “a dedicated code that is used to separate that system’s transmissions from all others.” EX1015, 1:27-59. Walley also discloses that the “spreading codes” are “commonly referred to as Pseudo Noise (PN) codes.” EX1015, 1:34-35. Walley teaches that this code can be lengthened to “increase the noise immunity and the transmission range of the signal.” *Id.*, 4:23-25.

240. Miyake discloses “spreading codes specific to individual users,” which is consistent with the ’000 patent’s explanation that a “unique user code...is specifically associated with one wireless digital audio system user.” EX1001, 2:57-59 Specifically, Miyake teaches a “spread spectrum communication system which

can simplify the management of users and services.” (EX1016, 2:23-26.)

241. Miyake describes a “spreading code” based on the output of two different spreading code generators (one for user-specific codes and another for attribute-based codes):

[A] spreading code supplied to the mixer 31 is what is obtained by mixing **a spreading code from the first spreading code generator 32, which produces spreading codes specific to individual users**, with a spreading code output from the second spreading code generator 33, which produces spreading codes assigned according to the attributes.

EX1016, 5:49-56; *see also id.*, 8:12-60.

242. Miyaki’s spreading code is “set on the transmitter side [and] should coincide with the spreading code set on the receiver side.” *Id.*, 7:12-21. Since the transmitter and receiver are using the same code, a POSA would understand that the code is a *fixed code*.

243. A POSA would have understood Miyake’s “spreading code” is a *specifically associated with one user of a device(s)* because Miyake repeatedly explains that the “spreading codes [are] specific to individual users.” EX1016, 5:49-56; *see also* EX1016, 7:12-21 (“the first spreading code [is] specific to the user”).

244. Thus, Miyake teaches a *unique user code* (i.e., a fixed code (bit sequence) specifically associated with one user of a device(s)).

245. A POSA would be motivated to combine the spreading process of Walley with Miyake's spreading process because it would combine Walley's dedicated system PN code (which can be lengthened to reduce interference) with Miyake's spreading code (which is based on a first code assigned to a user and an attribute-based second code) to provide a spreading process which creates user-specific spreading codes that can be lengthened to reduce interference.

246. This combination would involve the use of Miyake's known spreading process to improve Walley's similar spread spectrum process to provide user-specific spreading codes to create a flexible system which takes into account a user's transmission preferences.

247. For example, Walley explains that "the clarity and fidelity of sound in a portable phone may be an important consideration but, as the signal starts to fade, a user may willingly accept a somewhat lower fidelity in order to have an increased range." EX1015, 3:22-26. A POSA would understand that user-specific spreading codes would allow the system to identify users that are willing to accept a lower fidelity in exchange for an increased range and/or identify users that would prefer higher fidelity with a reduced range.

248. Moreover, it would be a simple substitution of one known element (Walley's system-based spreading code) for another (Miyaki's user-specific spreading code) to obtain predictable results (a user-specific spreading code).

249. For these reasons, it is my opinion that Walley in view of Miyake and Gibson thus render obvious a *mobile wireless digital audio receiver* (Walley's phone, speaker or headphones), *configured to receive a unique user code* (Walley's spreading code combined with Miyake's user-specific code) *and an original audio signal representation* (Walley's audio/music)...*said unique user code used to spread a spectrum of said signal.*

c. Walley in view of Miyake renders obvious a “receiver...*further configured for independent CDMA communication operation, said receiver independent of the operation of another receiver*”

250. I understand that, during previous claim construction for a related patent, the term “independent” in “independent CDMA” was taken to mean “performed independent of any central control.” §VII.

251. Walley teaches a transmitter which transmits a modulated signal. EX1015, 6:10-34 (“The output of the modulator is coupled to a RF power amplifier 217 and the antenna for broadcasting the signal”). Walley discloses a receiver which uses a transmitter's unique spreading code (“a dedicated code”) “to separate that system's transmission from all others”:

In a CDMA system, users transmit on the same frequency band. **Each CDMA system has a dedicated code that is used to separate that system's transmission from all others.**

EX1015, 1:27-40; *see also id.*, 1:41-48, 5:33-44.

Despreading the incoming signal with a particular code involves separating the original data, encoded with that particular code, from all other CDMA transmissions, and to recover the original data. **It is a property of PN codes that the presence of one PN code signal does not change the result of correlating the signal with another code. In other words the signal may be decoded using the proper PN code despite the fact that many other CDMA signals may be present. The property that one code does not interfere with the detection of the presence of another code is often referred to as orthogonality, and codes which possess this property are said to be orthogonal.**

EX1015, 1:48-59.

252. Walley does not teach whether the transmitter uses independent code division multiple access communication.

253. Miyake teaches a *transmitter...configured...to use independent code division multiple access communication* as Miyake teaches that “the spreading code set on the transmitter side should coincide with the spreading code set on the receiver side” and “those spreading codes should differ from those for the other channel users who also use this communication system.” EX1016, 6:63-7:18.

254. CDMA IS-95 is a U.S. digital cellular system based on CDMA and allows users throughout the cellular network to transmit on the same frequency band without interfering with one another by assigning each user a unique code. EX1022, 337, 643, 1198. One of ordinary skill in the art would understand that Walley in

combination with Miyake teaches a CDMA system which is independent as it describes a one to one correlation between a spread spectrum receiver (portable phone) and a spread spectrum transmitter (base station/speaker) where a receiver connects to only one transmitter, rather than a one to many correlation like CDMA IS-95 U.S. digital cellular system where a receiver (portable phone) is configured to roam between multiple different transmitters (base stations/speakers).

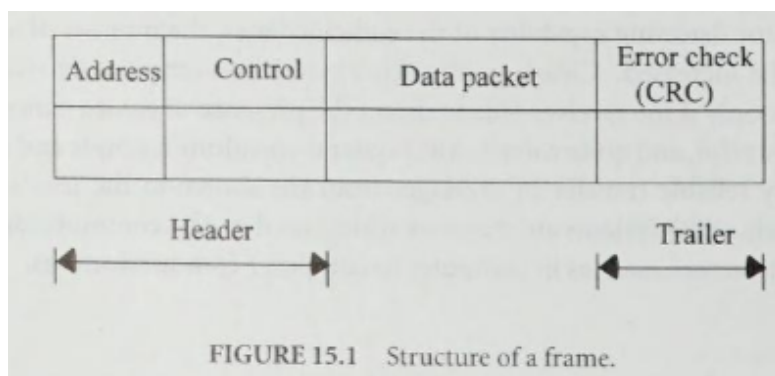
255. The one-to-one relationship between Miyake's receiver and transmitter teaches this definition as it does not require any centralized control. Additionally, Walley teaches that an orthogonal code is used to separate the transmissions of interest from the rest, so that the receiver only communicates with the transmitter of interest. Thus, Miyake alone and in view of Walley render obvious a *transmitter...configured to use independent code division multiple access communication, said receiver independent of the operation of another receiver.*

d. Walley in view of Miyake renders obvious a “receiver, configured to receive...an original audio signal representation in the form of packets”

256. Walley teaches the use of “data queues,” such as “transmit data queue 407,” where data “is maintained prior to transmission” and a “receive data [q]ueue 425, where it is held until the speech processing and decompression module 427 is ready to receive it.” EX1015, 6:60-61; 7:9-11 (“data transmit queue, 803,...acts as a buffer” EX1015, 7:36-37), “data is then stored in a data queue 203 until it is ready

to be transmitted” EX1015, 6:12-13). “When the next bit of data is ready to be transmitted, it is clocked out of the data queue.” EX1015, 6:13-14. A POSA would have understood that a “data queue” is a buffer which maintains the order of data received, and thus would have understood that Walley teaches or suggests an audio signal with an ordered sequence of bits.

257. Walley does not expressly disclose the characteristics of the bit sequence, such as how it is organized for transmission. However, it would have been obvious to a POSA to implement the system described in Walley to organize the transmitted audio bit sequence to provide *an audio signal representation in the form of packets*. First, a POSA would have been familiar with the use of packets in wireless digital communications and the advantages of such use. For example, Gibson teaches “the seven-layer open system interconnection (OSI) model” including a “data link layer, which transforms packets received from the network layer into *frames* by adding address, control and error check fields prior to their transmission.” EX1022, 182. Gibson further teaches the use of “parity check bits” which “allow the receiver to detect and possibly correct errors in the received frames.” *Id.* Gibson depicts an exemplary frame including “data packet” and “Error Check (CRC)” fields:



EX1022, 182 (FIG. 15.1).

258. Walley teaches a system which contemplates errors created based on “interference or jamming.” EX1015, 8:43. A POSA would have been motivated to use Gibson’s “packets” and parity check bits, such as the “Error check (CRC)” field to partition Walley’s transmitted audio bit stream as it would allow the receiver to determine whether there was a transmission error, and potentially correct the error.

Thus, Walley in view of Miyake and Gibson renders obvious *an original audio signal representation in the form of packets* (Walley’s audio bit stream partitioned based on Gibson).

[1A] a direct conversion module configured to capture packets and a correct bit sequence within the packets aided by lowering signal detection error through reduced intersymbol interference coding of said original audio signal representation, said packets embedded in the received spread spectrum signal, the captured packets corresponding to the unique user code;

259. It is my opinion that Walley in view of Miyake and Gibson renders obvious this limitation.

a. Walley in view of Gibson renders obvious “a direct conversion module configured to capture packets and a correct bit sequence within the packets”

260. I understand that, during previous claim construction for a related patent, the term “direct conversion module” was construed to mean a “module for converting radio frequency to baseband or very near baseband in a single frequency conversion without an intermediate frequency.” §VII.

261. Walley’s exemplary spread spectrum transmitter includes a “modulator 213, for modulating the carrier frequency 215” which is represented in FIG. 2, depicted below:

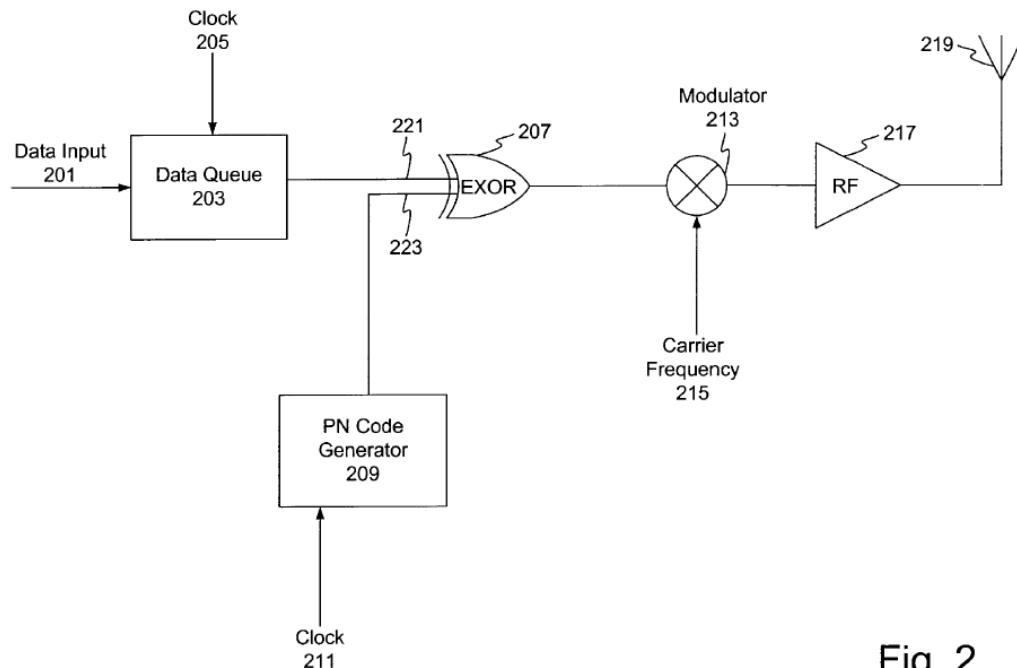


Fig. 2

EX1015, FIG. 2.

262. Walley discloses that the modulator’s output is “coupled to a RF power

amplifier 217 and the antenna for broadcasting the [analog] signal.” EX1015, 6:26-28. A POSA would have also understood that as alluded to above, Walley’s receiver would “de-spread” and “de-modulate” the received signal.

263. Walley indicates the receiver is *configured to receive wireless spread spectrum signal transmissions* and despreads them: “Despreading the incoming signal with a particular code involves separating the original data, encoded with that particular code, from all other CDMA transmissions, and to recover the original data.” EX1015, 1:47-51. A POSA would have understood that the disclosure of a transmitter which modulates a signal with a carrier frequency would teach or suggest a receiver which receives this transmission and performs the reciprocal steps. A POSA would have also understood that as alluded to above, the “de-spreading” in Walley’s receiver would be followed by “de-modulation” to remove the modulation from the original data, just as spreading with PN codes had been followed by modulation in Walley’s transmitter.

264. Walley teaches conversion of the received signal to baseband (as the received analog signal is converted into a digital signal alongside despreading) which can be done indirectly or directly without an intermediate carrier frequency (which is equivalent to a zero frequency intermediate carrier). Walley does not specify which of these approaches are employed, that is whether it is done directly or indirectly. As such Walley does not disclose whether its receivers directly convert

the received signal to baseband without using an intermediate frequency. Gibson discloses a “single conversion receiver/“direct conversion receiver” which converts a received signal to baseband with “zero IF” (i.e., without using an intermediate frequency):

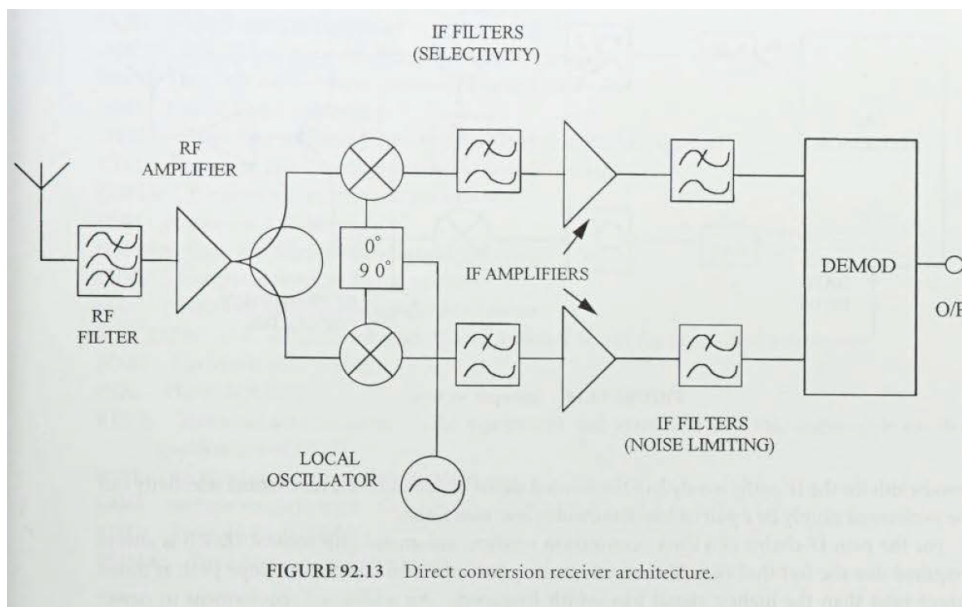
We have discussed the need for low power consumption and low cost in designing cordless telephones. These days digital transmitter/single conversion receiver techniques are employed to provide highly accurate quadrature modulation formats and quadrature down conversion schemes that allow a great deal of flexibility to the baseband section. Generally, one would have used digital signal processors to perform most of the demodulation functions at the cost of high current consumption. With the advent of application specific signal processing, solutions with these techniques have become more attractive.

EX1022, 1322-23.

The direct conversion receiver usually has an intermediate frequency nominally at zero frequency, hence the term zero IF. The effect of this is to fold the spectrum about zero frequency, which results in the signal occupying only one-half the bandwidth. **The zero IF architecture possesses several advantages over the normal superheterodyne approach.** First, selectivity requirements for the RF filter are greatly reduced due to the fact that the IF is at zero frequency and the image response is coincident with the wanted signal frequency. Second, the choice of zero frequency means that bandwidth for the IF

paths is only half the wanted signal bandwidth. Third, channel selectivity can be performed simply by a pair of low-bandwidth low-pass filters.

EX1022, 1323-24.



Id., FIG. 92.13.

265. It would have been obvious to combine Gibson's direct conversion receiver with the teachings of Walley to provide a receiver including a *direct conversion module configured to receive wireless spread spectrum signal transmissions* in view of Walley's teaching of a "despreader" to perform "separating the original data, encoded with that particular code, from all other CDMA transmissions, and to recover the original data". Gibson is a communications handbook which includes "articles or chapters" that are "written as tutorials or

overviews, so that once the reader locates the broader topic, it is easy to find an answer to a specific question.” EX1022, iii, title. Gibson explains the benefits of using a “direct conversion receiver” (EX1022, 1322-24), explaining that it is suitable for portable receivers (cordless phones) which need “low power consumption and low cost” (*id.*, 1322) and provides “several advantages over the normal superheterodyne approach” (*id.* 1323-24), which would use one or more intermediate frequencies. A POSA would have understood that a receiver, such as wireless headphones, would benefit from a component suitable for “low power consumption and low cost” designs. Additionally, a POSA would have understood that the use of Gibson’s direct conversion receiver as part of the demodulator suggested by Walley is a simple substitution of one known frequency conversion technique for another to achieve the predictable result of a conversion from a carrier frequency to baseband without the use of an intermediate frequency. Alternatively, a POSA would have understood that the inclusion of Gibson’s direct conversion receiver in Walley’s receiver is the combination of prior art elements according to known methods to yield predictable results.

b. Walley in view of Gibson renders obvious “*a correct bit sequence within the packets aided by lowering signal detection error through reduced intersymbol interference coding of said original audio signal representation*”

266. As I explain in Section VII above, the term “[reduce/reduction of]

intersymbol interference coding” was construed to mean “coding that reduces intersymbol (inter-symbol) interference.”

267. As I explained in [1P], (1) Walley in view of Miyaki renders obvious audio which is *received* in a *spread spectrum signal* based on a *unique user code*, and (2) Walley in view of Gibson renders obvious an *audio signal representation in the form of packets* (Walley’s audio bit stream partitioned based on Gibson). It would have been obvious to combine these teachings to implement Walley’s system to transmit packets within a spread spectrum signal and then configure the receiver to *capture...a correct bit sequence within the packets... said packets embedded in the received spread spectrum signal, the captured packets corresponding to the unique user code* because packets are a conventional manner of organizing data transmissions and spread spectrum modulation is a flexible form of data transmission which can be used to transmit sequenced data.

268. Walley further describes a system in which an audio signal (such as “continuous speech” or “any manner of data”) “is “digitized and compressed,” and then “provided to transmit data queue 407, where it is maintained prior to transmission.” EX1015, 6:51-7:26; FIG. 4 (depicting wireless transmission of audio between two devices); *see also id.* at 12:15-24 (describing speakers receiving wireless audio transmission). Walley explains that when the system is ready to transmit, a “PN code” is “exclusive Exor’ed with each bit of the data code” and the

“output of the Exor (Exclusive Or) gate 207 is coupled with the modulator 213, for modulating the carrier frequency 215. The output of the modulator is coupled to a RF power amplifier 217 and the antenna 219 for broadcasting the signal.” EX1015, 6:10-34. Walley also explains that the “length of the PN code” can be increased by the “transmit controller” to “overcome interference”. EX1015, 8:40-43. One of ordinary skill in the art would understand that increasing the length of the PN code applied to the transmit data to overcome interference is equivalent to *the transmissions are encoded to reduce intersymbol interference*. Walley also teaches *the received transmissions are encoded to reduce intersymbol interference*, given that the receiver performs the reciprocal processes to the transmitter a POSA would understand the audio receiver also performs processes to reduce interference.

269. Additionally, Walley does not expressly disclose how the audio signal is “encoded” prior to transmission. Gibson teaches that intersymbol interference can be reduced by introducing a “controlled amount of intersymbol” inference to a signal and “precod[ing]” the signal can be used to compensate for (*reduce*) *intersymbol interference*:

To avoid the problems associated with Nyquist signalling over an ideal bandlimited channel, bandwidth and/or power efficiency must be compromised. Raised cosine pulses compromise bandwidth efficiency to gain robustness with respect to timing errors. **Another possibility is to introduce a controlled amount of intersymbol at the transmitter,**

which can be removed at the receiver. This approach is called partial-response (PR) signalling.

EX1022, 329.

Consider the received signal sample Eq. (25.27) with duobinary signalling. If the receiver has correctly decoded the symbol A_{k-1} , then in the absence of noise A_k can be decoded by subtracting A_{k-1} from the received sample Y_k . If an error occurs, however, then subtracting the preceding symbol estimate from the received sample will cause the error to propagate to successive detected symbols. **To avoid this problem, the transmitted levels can be precoded in such a way as to compensate for the intersymbol interference introduced by the overall partial response.**

EX1022, 333.

Precoding the symbols $\{b_k\}$ in this manner, therefore, enables symbol-by-symbol decisions at the receiver. In the presence of noise, more sophisticated detection schemes (e.g., maximum likelihood) can be used with PR signalling to obtain improvements in performance.

EX1022, 334; *see also id.*, 333.

270. A POSA would be motivated to combine Gibson's precoding techniques with Walley to mitigate the intersymbol interference in digital data communication systems by encoding/decoding a digitized audio signal using Gibson's precoding techniques to provide a transmitter which creates *transmissions*

[that] are encoded to reduce intersymbol interference and a receiver which processes said received transmissions for reduction of intersymbol interference. A POSA would have understood that the addition of Gibson's precoding techniques to Walley's system is the use of a known technique (precoding) to improve a similar digital data communication system in the same way (to reduce intersymbol interference).

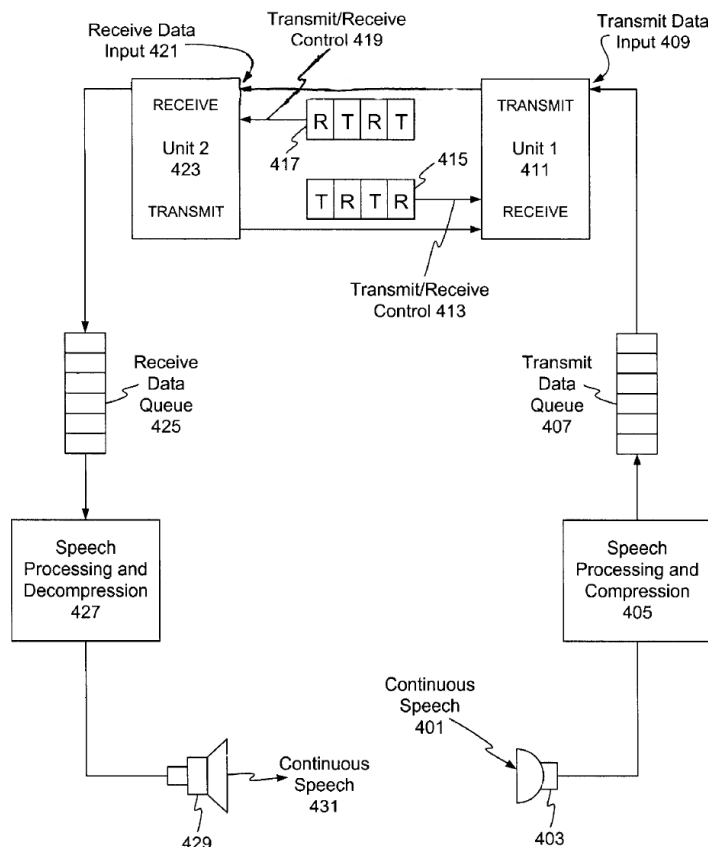
271. For these reasons, it is my opinion that Walley in view of Miyake and Gibson thus render obvious *a direct conversion module (Gibson's direct conversion receiver) configured to capture packets and a correct bit sequence within the packets (Walley's audio bit stream partitioned based on Gibson) aided by lowering signal detection error through reduced intersymbol interference coding (Gibson's precoding) of said original audio signal representation, said packets embedded in the received spread spectrum signal, the captured packets corresponding to the unique user code.*

[1B] a decoder operative to decode the reduced intersymbol interference coding of said original audio signal representation wherein each user has their audio receiver configured to communicate with their own separate audio transmitter, and said receiver virtually free from interference from transmission and reception device signals operating in the shared spectrum.

272. It is my opinion that Walley in view of Miyake and Gibson renders obvious this limitation.

c. Walley in view of Miyake and Gibson renders obvious “a decoder operative to decode the reduced intersymbol interference coding of said original audio signal representation”

273. Walley describes a system which includes a speech processing and compression block 405 (which digitizes an audio signal before transmission) and a corresponding speech processing and decompression block 427 (*decoder operative to decode the demodulated transmission*) to reverse that process to provide an audio signal to speaker 429:



EX1015, FIG. 4.

The Microphone 403 is coupled to a speech processing and compression block 405 where the continuous speech is digitized and compressed. The resulting data is provided to the transmit data queue 407, where it is maintained prior to transmission. . . **When the speech processing and decompression module 427 is ready to receive, the data is provided from the receive data queue 425 to the speech processing and decompression module 427 for processing and decompression. The decompressed, processed speech is then provided to an output device, such as the speaker 429, for reproducing it as continuous speech 431.**

EX1015, 6:57-7:26.

274. As I explained above with respect to [1A], Gibson teaches that a signal can be encoded by introducing a “controlled amount of intersymbol” inference “at the transmitter, which can be removed at the receiver” using “partial-response (PR) signaling” (EX1022, 329) and then “precod[ing]” the signal “in such a way as to compensate for...intersymbol interference.” (i.e., *coding that reduces intersymbol (inter-symbol) interference*). EX1022, 333. A POSA would have been motivated to combine Gibson with Walley to compensate for intersymbol interference in digital communication systems by encoding/decoding a digitized audio signal using Gibson’s precoding techniques to provide a transmitter which creates an *original audio signal representation* that has been encoded to provide *reduced intersymbol interference coding*. A POSA would have understood that a precoded audio

transmission would require a *decoder operative to decode the reduced intersymbol interference coding of said original audio signal representation.*

**d. Walley in view of Miyake and Gibson renders obvious
“wherein each user has their audio receiver configured to
communicate with their own separate audio transmitter, and
said receiver virtually free from interference from
transmission and reception device signals operating in the
shared spectrum”**

275. Walley discloses a receiver which uses a transmitter’s unique spreading code (“a dedicated code”) “to separate that system’s transmission from all others” “on the same frequency band.” EX1015, 1:27-40; *see also id.*, 1:41-59 (“The property that one code does not interfere with the detection of the presence of another code is often referred to as orthogonality”), 5:33-44 (“Spread spectrum communication has the advantage that more than one spread spectrum transmitter may broadcast in the same frequency spectrum without blocking the demodulation of other concurrent spread spectrum transmissions which are using different[] PN spreading codes”).

276. A POSA would have understood that a *receiver* which uses the transmitter’s unique spreading code “to separate that system’s transmissions from all others” “on the same frequency band” would be *virtually free from interference from transmission and reception device signals operating in the shared spectrum.* EX1015, 1:27-59, 5:33-44.

277. Walley does not teach whether a user has their own receiver or their own transmitter. Miyake teaches “spreading codes specific to individual users.” EX1016., 5:49-56. Miyake teaches that “the spreading code set on the transmitter side should coincide with the spreading code set on the receiver side” and “those spreading codes should differ from those for the other channel users who also use this communication system.” EX1016, 6:63-7:18. The one-to-one relationship between Miyake’s receiver and transmitter teaches that *each user has their audio receiver configured to communicate with their own separate audio transmitter. See also [1P](c)* (regarding one-to-many correlation of CDMA IS-95).

278. A POSA would have been motivated to implement Walley’s system such that *each user has their audio receiver configured to communicate with their own separate audio transmitter* in view of Miyake because Walley does not discuss who owns/controls what device, and Miyake teaches a user-specific system which envisions a one-to-one relationship between a user’s receiver and a corresponding transmitter.

3. Claim 2

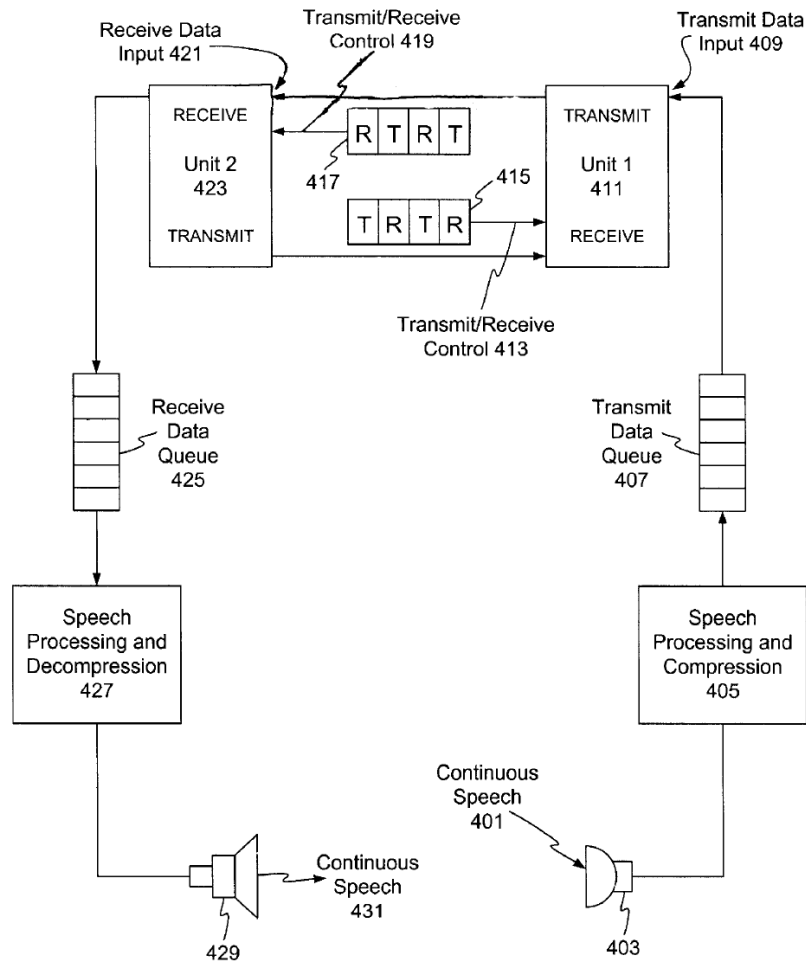
279. Claim 2 largely corresponds to Claim 1 as I indicated in the below table, and thus, claim 2 is rendered obvious for the same reasons that I proved above for claim 1 for their matching claims or claim limitations. There are however, two claim limitations which do not have a corresponding limitation: [2C] and [2D].

Limitation	Corresponding Limitation
[2P]	[1P]
[2A]	[1A]
[2B]	[1B]

[2C] a digital-to-analog converter generating an audio output of said original audio signal representation; and;

280. It is my opinion that Walley in view of Miyake and Gibson renders obvious this limitation.

281. Walley describes a system including a speech processing and compression block 405 (which “digitizes” an audio signal before transmission) and a corresponding speech processing and decompression block 427 to reverse that process to provide an audio signal to speaker 429:



EX1015, FIG. 4.

The Microphone 403 is coupled to a speech processing and compression block 405 where the continuous speech is digitized and compressed. The resulting data is provided to the transmit data queue 407, where it is maintained prior to transmission....the data is provided from the receive data queue 425 to the speech processing and decompression module 427 for processing and decompression. The decompressed, processed speech is then provided to an output

device, such as the speaker 429, for reproducing it as continuous speech 431.

EX1015, 6:57-7:26, 9:13-17 (“If for instance the data is an analog voice waveform...the data input controller may perform an analog to digital conversion function.”).

282. A POSA would have understood that a system which converts an input from analog-to-digital before transmission would teach or suggest a digital-to-analog converter for *generating an audio output* (an analog signal) *of said original audio signal representation* (received digital audio signal).

[2D] a module adapted to produce said generated audio output, wherein each user has their audio headphone configured to communicate with their own separate audio transmitter, and said audio virtually free from interference from transmission and reception device signals operating in a shared wireless headphone spectrum.

283. It is my opinion that Walley in view of Miyake and Gibson renders obvious this limitation.

284. Walley discloses a receiver (portable phone, headphones, or a speaker) which includes a speaker to output the converted analog signal (*a module adapted to produce said generated audio output*). EX1015, 6:57-7:26 (“The decompressed, processed speech is then provided to an output device, such as the speaker 429”); *see also id.*, 6:51-56, 12:15-24 (“Another embodiment...comprises a set of wireless speakers”).

285. As I explained above with respect to [1B], Walley in view of Miyake and Gibson renders obvious *wherein each user has their audio headphone configured to communicate with their own separate audio transmitter, and said audio virtually free from interference from transmission and reception device signals operating in a shared...spectrum.*

286. In addition, as discussed above, Walley teaches a receiver such as wireless headphones. EX1015, 2:33-39, 2:66-3:1. Walley also teaches that, “[i]n a CDMA System, users transmit on the same frequency band.” EX1015, 1:28-29. Thus, Walley in view of Miyake and Gibson renders obvious *a shared wireless headphone spectrum.*

4. Claim 3

[3P] A wireless digital audio headphone comprising:

287. I understand that this part of the claim is called the preamble. I also understand that there are special rules that apply to whether a preamble of a claim is a limitation or not. I have not been asked to apply those rules in my analysis. Instead, I have been asked to presume that this is a limitation of the claims. I have done so.

288. It is my opinion that Walley in view of Miyake and Gibson renders obvious the preamble. *See [1P].*

[3A] a digital audio headphone receiver configured to receive an unique user code bit sequence and a original audio signal representation in the form of packets, said digital audio headphone receiver, capable of mobile operation and configured for direct digital coded wireless spread spectrum communication with a mobile digital audio transmitter, and said user has their headphone configured to communicate with their own transmitter;

289. It is my opinion that Walley in view of Miyake and Gibson renders obvious this limitation.

290. Walley in view of Miyake and Gibson renders obvious *a digital audio headphone receiver* (Walley's headphones) *configured to receive an unique user code bit sequence* (Walley's spreading code combined with Miyake's user-specific code) *and an original audio signal representation in the form of packets* (Walley's audio, partitioned into packets as disclosed in Gibson), *said digital audio headphone receiver, capable of mobile operation*. See [1P].

291. Walley teaches "generic type spread spectrum controllers which can be used in a variety of applications." EX1015, Abstract. These controllers address "Problems With the Current Art" relating to the "different requirements" of "wireless communications electronics, such as cordless and cellular telephones, [and] wireless units to transmit music to speakers or headphones." EX1015, 2:33-39, 2:66-3:1, 12:15-25. Walley discloses a "representative example of a portable telephone," which includes a "mobile hand unit" and "a base unit." *Id.*, 6:48-66.

292. Thus, Walley teaches a *receiver* (headphone or mobile hand

unit)...*configured for direct digital coded wireless spread spectrum communication with a mobile digital audio transmitter* (“base unit”, a “wireless unit”, or a “hand unit”).

293. As I explained above with respect to [1B], Walley in view of Miyake renders obvious *each user has their audio receiver configured to communicate with their own separate audio transmitter*. Since Walley teaches a headphone receiver, Walley in view of Miyake renders obvious *said user has their headphone configured to communicate with their own transmitter*. See [1B].

294. Thus, Walley in view of Miyake and Gibson render obvious *said user has their headphone configured to communicate with their own transmitter*.

[3B] a direct conversion module configured to capture packets and the correct bit sequence within the packets aided by lowering signal detection error through reduced intersymbol interference coding of said original audio signal representation said packets embedded in the received spread spectrum signal, the captured packets corresponding to the unique user code;

295. It is my opinion that Walley in view of Miyake and Gibson renders obvious this limitation. See [1A].

[3C] a digital demodulator configured for independent CDMA communication operation wherein a user has their own transmitter and receiver;

296. It is my opinion that Walley in view of Miyake and Gibson renders obvious this limitation.

297. Walley discloses modulating a signal for transmission and then demodulating the signal by a receiver using “CDMA”:

CDMA[] is a method of signal modulation which distributes the data contained in a signal over a wide bandwidth.

EX1015, 5:13-15; *see also id.*, 3:34-36, 5:16-44, FIG. 2, 6:10-26 (describing CDMA modulation in FIG. 2), 1:41-51 (despreading).

298. Walley’s spread spectrum transmitter also includes a “modulator 213, for modulating the carrier frequency 215.” EX1015, 6:10-34. While Walley does not expressly recite the use of a demodulator in the audio receiver, a POSA would have understood that modulations performed prior to transmission by the transmitter must be demodulated by the audio receiver. Thus, Walley teaches a *digital demodulator* (receiver’s counterpart of modulator 213 and/or the CDMA demodulator).

299. As I explained above with respect to [1P], Miyake alone and in view of Walley teaches *configured for independent CDMA communication operation*.

300. As I explained above with respect to [1B], Walley in view of Miyake render obvious *each user has their audio receiver configured to communicate with their own separate audio transmitter*.

301. Thus Walley in view of Miyake and Gibson render obvious *configured for independent CDMA communication operation wherein a user has their own transmitter and receiver*.

[3D] a decoder operative to decode the reduced intersymbol interference coding of original audio signal representation;

302. It is my opinion that Walley in view of Miyake and Gibson renders obvious this limitation. *See* [1B].

[3E] a digital-to-analog converter (DAC) generating an audio output of said original audio signal representation; and

303. It is my opinion that Walley in view of Miyake and Gibson renders obvious this limitation. *See* [2C].

[3F] a module responsive to the unique user code bit sequence to produce said generated audio output wherein each user has their audio headphone configured to communicate with their own separate audio transmitter, said output virtually free from interference from transmission and reception device signals operating in the shared wireless headphone spectrum.

304. It is my opinion that Walley in view of Miyake and Gibson renders obvious this limitation.

305. Walley teaches the use of a “spreading code” “to separate that system’s transmissions from all others.” EX1015, 1:30-34. Walley explains that “[t]o decode a spread spectrum transmission at the receiver, it is necessary to ‘despread’ the code.” EX1015, 1:41-43.

306. As I explained above with respect to [1P], a POSA would have been motivated to combine Walley’s spreading code combined with Miyake’s user-specific code (*unique user code bit sequence*) to modulate an audio signal for transmission and then demodulate/despread the signal at the receiver.

307. Miyake teaches *each user has their audio headphone configured to communicate with their own separate audio transmitter* as Miyake teaches that “the spreading code set on the transmitter side should coincide with the spreading code set on the receiver side” and “those spreading codes should differ from those for the other channel users who also use this communication system.” EX1016, 6:63-7:18.

308. Additionally, Walley teaches *output virtually free from interference from transmission and reception device signals operating in the shared wireless headphone spectrum* as Walley teaches that an orthogonal code is used to separate the transmissions of interest from the rest, so that the receiver only communicates with the transmitter of interest.

309. Walley teaches that the received signal is processed and “provided to an output device, such as the speaker 429.” EX1015, 7:8-19. Walley also teaches that users in CDMA systems transmit on the same frequency band. EX1015, 1:28-29. Thus, Walley in view of Miyake and Gibson render obvious a receiver including *a module responsive to the unique user code bit sequence to produce said generated audio output*.

5. Claim 4

Claim 4. The wireless digital audio headphone of claim 3, wherein the audio output is music.

310. It is my opinion that Walley in view of Miyake and Gibson renders

claim 4 obvious.

311. Walley teaches “generic type spread spectrum controllers” for “cordless and cellular telephones, [and] wireless units to transmit **music** to speakers or headphones.” EX1015, Abstract, 2:33-39, 12:15-25. Walley discloses a “base unit” that can “broadcast a high fidelity **music** signal to the hand unit” when a person “was placed on hold.” *Id.*, 7:36-40.

6. Claim 5

312. Claim 5 largely corresponds to Claims 1 and 2 as I indicated in the below table, and thus, claim 5 is rendered obvious for the same reasons that I proved above for claims 1 and 2 for their matching claims or claim limitations:

Limitation	Corresponding Limitation
[5P]	[1P]
[5A]	[1A]
[5B]	[1B]
[5C]	[2C]
[5D]	[2D]

7. Claim 8

[8P] A wireless digital coded music audio spread spectrum transmitter operatively coupled to a music audio source and configured to transmit a unique user code and an original audio signal representation in the form of packets, wherein said digital coded music audio transmitter coupled to said music audio source, and configured to be directly communicable with a mobile digital audio spread spectrum receiver, is capable of being moved in any direction during operation, said wireless digital coded audio transmitter comprising:

313. I understand that this part of the claim is called the preamble. I also understand that there are special rules that apply to whether a preamble of a claim is a limitation or not. I have not been asked to apply those rules in my analysis. Instead, I have been asked to presume that this is a limitation of the claims. I have done so.

314. It is my opinion that Walley in view of Miyake and Gibson renders obvious the preamble.

- a. **Walley in view of Miyake and Gibson renders obvious a**
“wireless digital coded music audio spread spectrum transmitter operatively coupled to a music audio source...wherein said digital coded music audio transmitter coupled to said music audio source...is capable of being moved in any direction during operation”

315. Walley teaches “generic type spread spectrum controllers” (EX1015, Abstract) suitable for “cordless and cellular telephones, [and] wireless units to transmit music to speakers or headphones”:

Problems Within the Current Art

As popularity increases for wireless communications electronics, such as **cordless and cellular telephones, wireless units to transmit music to speakers or headphones**, programmable digital assistants and computers with wireless links, pagers, and wireless tracking devices, the demand for cheaper, higher performance devices also increases.

EX1015, 2:33-39, 2:66-3:1, 12:15-25 (“Another embodiment of the system comprises a set of wireless speakers”).

316. Walley discloses “a portable telephone,” which includes a “mobile hand unit” and “a base unit”:

FIG. 4. is a block diagram, of a representative example of a portable telephone, showing the transmission and reception of continuous speech using a Time Division Duplex (TDD) protocol. Continuous speech 401 is provided to the system via a microphone 403. Those skilled in the art will realize that instead of a continuous speech input and a continuous speech output, any manner of data could be substituted and the method described would be equally viable.

The Microphone 403 is coupled to a speech processing and compression block 405 where the continuous speech is digitized and compressed. The resulting data is provided to the transmit data queue 407, where it is maintained prior to transmission. **Unit 1, 411, is a transmit and receive unit, for example the base unit of a portable phone**. The transmitting and receiving times of Unit 1, 411 are represented by the time slices 415, which are marked R, for receive,

and T for transmit. **Unit 2, 423 is a transmit and receive unit, for example the mobile hand unit of a portable phone.**

Id., 6:48-66, FIG. 4.

317. The “base unit” can “broadcast a high fidelity music signal to the hand unit” when a person “was placed on hold.” *Id.*, 7:36-40. Thus, Walley teaches a *wireless digital coded music audio spread spectrum transmitter* (“base unit”, a “wireless unit”, or a “hand unit”) that *is capable of being moved in any direction during operation*.

318. A POSA would have understood that transmitting music to speakers, headphones, or a portable phone’s “hand unit” would require the *transmitter* to include or be connected to (and thus would be *operatively coupled to*) a *music audio source*. A POSA would have also understood that Walley’s “wireless communications electronics, such as cordless and cellular telephones, **wireless units to transmit music to speakers or headphones**, programmable digital assistants and computers with wireless links, pagers, and wireless tracking devices” (EX1015, 2:33-39) teaches a *digital coded music audio transmitter that is capable of being moved in any direction during operation*. Thus, Walley in view of Miyake and Gibson renders obvious a *wireless digital coded music audio spread spectrum transmitter* (“base unit”, a “wireless unit”, or a “hand unit”) *operatively coupled to a music audio source...wherein said digital coded music audio transmitter coupled*

to said music audio source...is capable of being moved in any direction during operation.

b. Walley in view of Miyake and Gibson renders obvious a “transmitter...configured to transmit a unique user code and an original audio signal representation in the form of packets, configured to be directly communicable with a mobile digital audio spread spectrum receiver, is capable of being moved in any direction during operation”

319. I understand that, during previous claim construction for a related patent, the term “unique user code” was taken to mean “fixed code (bit sequence) specifically associated with one user of a device(s).” §VII.

320. Walley discloses a spread spectrum system that uses a “spreading code[]” (“commonly referred to as Pseudo Noise (PN) codes”) which Walley discloses as a “a dedicated code that is used to separate that system’s transmissions from all others”:

In a CDMA system, users transmit on the same frequency band. **Each CDMA system has a dedicated code that is used to separate that system’s transmission from all others. These codes are commonly referred to as spreading codes**, because the information density is small compared with the bandwidth size. These codes are also commonly referred to as a Pseudo Noise (PN) codes, because their seemingly random arrangement contains many of the characteristics of a pure noise signal. In a CDMA transmission, each bit of data to be transmitted is replaced by a spreading code if the data to be transmitted

is a “1”, and is replaced by the inverse of the spreading code if the data to be transmitted is “0”.

EX1015, 1:27-41; *see also id.*, 1:42-59.

321. Walley explained that “[i]n a CDMA transmission, each bit of data to be transmitted is replaced by a spreading code if the data to be transmitted is a ‘1’, and is replaced by the inverse of the spreading code if the data to be transmitted is ‘0’.” EX1015, 1:38:41.

322. Walley teaches that this code can be lengthened to “increase the noise immunity and the transmission range of the signal.” *Id.*, 4:23-25.

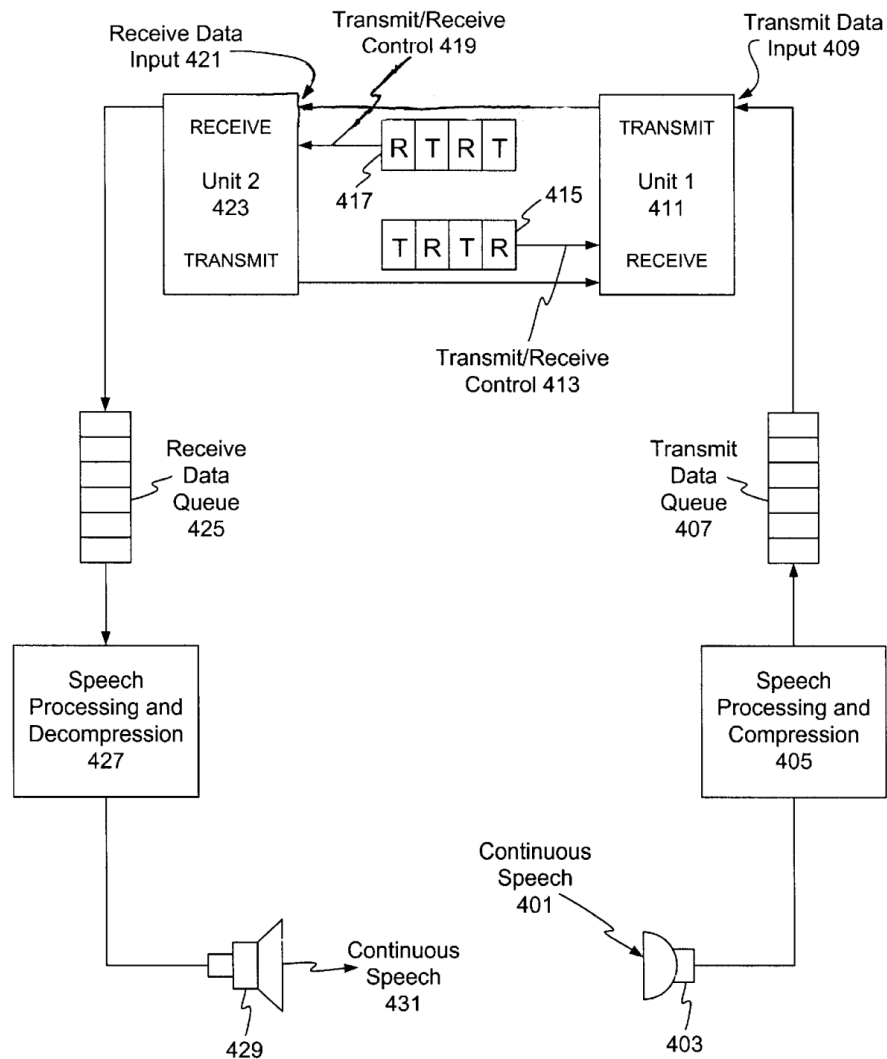
323. As I explained above with respect to [1P] and [3F], a POSA would have been motivated to combine Walley’s spreading code combined with Miyake’s user-specific code (*unique user code bit sequence*) to modulate an audio signal for transmission. Walley in view of Miyake and Gibson renders obvious *an original audio signal representation in the form of packets*. *See* [1P].

324. Thus, Walley in view of Miyake and Gibson renders obvious a *transmitter...configured to transmit a unique user code and an original audio signal representation in the form of packets*.

**c. Walley in view of Miyake and Gibson renders obvious a
“transmitter...configured to be directly communicable with a
mobile digital audio spread spectrum receiver”**

Walley depicts a transmitting unit (411) directly communicating with a

receiving unit (423):



EX1015, FIG. 4.

325. Thus, Walley teaches a *transmitter configured to be directly communicable with a mobile digital audio spread spectrum receiver.*

[8A] encoding operative to encode said original audio signal representation to reduce intersymbol interference and aid in lowering signal detection error of said audio representation signal respective to said receiver and mobile said transmitter coupled to said music audio source;

326. It is my opinion that Walley in view of Miyake and Gibson renders obvious this limitation.

327. I understand that, during previous claim construction for a related patent, the term “[reduce/reduction of] intersymbol interference coding” was construed to mean “coding that reduces intersymbol (inter-symbol) interference.” *See* §VII.

328. Walley teaches a system in which an audio input signal is digitized and processed (by speech processing and compression block 405) prior to transmission. *See* [3B]. Thus, Walley teaches an *encoder* (speech processing and compression block 405).

329. Gibson teaches precoding methods encode/decode a transmission for reduced intersymbol interference in digital communication systems (i.e., *coding that reduces intersymbol (inter-symbol) interference*). *See* [1A].

330. A POSA would have been motivated to combine Gibson’s precoding techniques with Walley’s speech processing and compression block 405 (*encoder*) to mitigate the “common problem” of intersymbol interference in digital data communication systems by encoding a digitized audio signal using Gibson’s

precoding techniques to perform *encoding operative to encode said original audio signal representation to reduce intersymbol interference*. See [1A]. Gibson teaches that the “precoder compensates for the intersymbol interference introduced by the channel, allowing the receiver to detect the data by a simple threshold operation.” EX1022, 336. Thus, a POSA would have understood that Gibson’s precoding would additionally *aid in lowering signal detection error of said audio representation signal respective to said receiver and mobile said transmitter coupled to said music audio source*.

[8B] a digital modulator module configured for independent code division multiple access communication operation, wherein each user has their own separate transmitter configured to communicate with their receiver, said transmitter configured to wirelessly transmit said audio to be reproduced virtually free from interference from transmission and reception device signals operating in the wireless digital audio transmitter shared spectrum.

331. Walley in view of Miyake and Gibson renders obvious this limitation.

332. Walley teaches modulating a signal for transmission using CDMA. EX1015, 5:13-15; *see also id.*, 5:16-44, FIG. 2, 6:10-26 (describing CDMA modulation in FIG. 2). See [3C]. Walley’s spread spectrum transmitter also includes a “modulator 213, for modulating the carrier frequency 215.” EX1015, 6:10-34. Thus, Walley teaches *a digital modulator module* (CDMA modulator and/or modulator 213).

Walley in view of Miyake and Gibson renders obvious *independent code*

division multiple access communication operation. See [3C].

333. As explained in [1B], Walley in view of Miyake and Gibson renders obvious *each user has their audio receiver configured to communicate with their own separate audio transmitter, and said receiver virtually free from interference from transmission and reception device signals operating in the shared spectrum.* As reflected with corresponding annotations (red, green, blue) above and below, [8B] recites materially the same limitations, and thus, Walley in view of Miyake and Gibson renders obvious *renders obvious each user has their own separate transmitter configured to communicate with their receiver, said transmitter configured to wirelessly transmit said audio to be reproduced virtually free from interference from transmission and reception device signals operating in the wireless digital audio transmitter shared spectrum.*

8. Claim 9

334. Claim 9 largely corresponds to Claim 1, as I indicated in the below table, and thus, claim 9 is rendered obvious for the same reasons that I proved above for claim 1 for their matching claims or claim limitations. There is, however, one claim limitation which does not have a corresponding limitation: [9P].

Limitation	Corresponding Limitation
[9A]	[1A]

[9B]	[1B]
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[9P] A mobile wireless digital audio receiver capable of being moved in any direction during operation and configured to receive a unique user code and an original audio signal representation in the form of packets, said unique user code used to spread a spectrum of said signal and further configured for independent CDMA communication operation, said receiver independent of the operation of another receiver, said wireless digital audio receiver comprising:

335. It is my opinion that Walley in view of Miyake and Gibson renders obvious this limitation.

336. Walley in view of Miyake and Gibson renders obvious *a mobile wireless digital audio receiver...configured to receive a unique user code and an original audio signal representation in the form of packets, said unique user code used to spread a spectrum of said signal and further configured for independent CDMA communication operation, said receiver independent of the operation of another receiver. See [1P].*

337. As I explained in [1P], Walley teaches a headphone receiver and a POSA would have understood that a headphone is mobile and thus is *capable of being moved in any direction during operation.*

9. Claim 10

338. Claim 10 largely corresponds to Claim 8, as I indicated in the below table, and thus, claim 10 is rendered obvious for the same reasons that I proved above

for claim 8 for their matching claims or claim limitations:

Limitation	Corresponding Limitation
[10P]	[8P]
[10A]	[8A]
[10B]	[8B]

339. While claim 8 requires a “music audio source,” claim 10 more broadly requires an “audio source.” Thus, claim 10 is rendered obvious for the same reasons as claim 8.

C. Ground 3: Walley in view of Miyake, Gibson, and Rappaport Renders Obvious Claims 11-12.

1. Overview of the combination; motivation to combine; expectation of success

340. Ground 3 relies on Walley in view of Miyake, Gibson and Rappaport. A POSA would have been motivated to combine the teachings of Walley, Miyake and Gibson for the reasons provided in Ground 2.

341. A POSA would additionally have been motivated to combine these teachings with Rappaport. As explained in Sections VI.C.3 and VIII.B.2.a, Walley teaches a CDMA spread spectrum controller suitable for a range of devices, but Walley does not expressly disclose certain implementation details for the receiver and transmitter, including how its audio signal is modulated prior to transmission.

342. Rappaport is a textbook whose purpose “to initiate the newcomer to cellular radio and wireless personal communications.” EX1018, xiii. A POSA would have been motivated to use the teachings of the Rappaport textbook to provide the implementation details required to create a transmitter and receiver based on Walley’s teachings, and would have had a reasonable expectation that applying Rappaport’s teachings to Walley would be successful.

343. A POSA would have reasonably expected to succeed in implementing Rappaport’s teachings in Walley’s system because Rappaport was “designed for the student or practicing engineer” (EX1018, xiii) and “provides extensive coverage of the most common analog and digital modulation techniques used in mobile communications” (EX1018, xiv).

Challenged Claims

2. Claim 11

Claim 11. The wireless digital audio receiver of claim 8, wherein the spread spectrum receiver module is further configured to utilize differential phase shift keying (DPSK) to demodulate said audio signal representation.

344. To the extent the *spread spectrum receiver module* refers to the *mobile digital audio spread spectrum receiver* of claim 8 or a component of this *receiver*,⁴ it is my opinion that Walley in view of Miyake, Gibson and Rappaport renders

⁴ See FN6-ZOT.

obvious this limitation.

345. Walley's spread spectrum transmitter includes a "modulator 213, for modulating the carrier frequency 215." EX1015, 6:10-34. Walley does not expressly disclose what modulation is performed by modulator 213. A POSA would have understood that this modulator could include a DPSK modulator. For example, Rappaport teaches that Differential PSK (DPSK) is a "widely used" modulation technique which advantageously "avoids the need for a coherent reference signal at the receiver" and whose receivers are "easy and cheap to build." EX1018, 242.

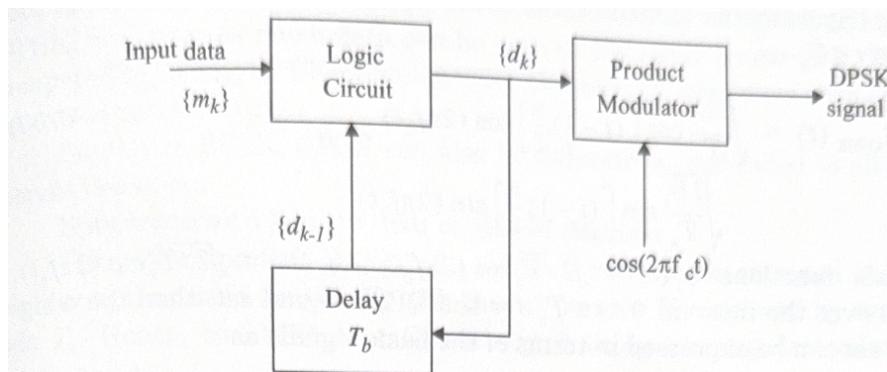


Figure 5.24
Block diagram of a DPSK transmitter.

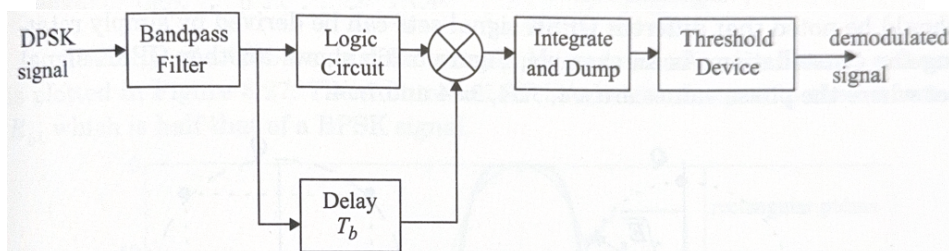


Figure 5.25
Block diagram of DPSK receiver.

EX1018, FIG. 5.24, 5.25.

346. A POSA would have understood that the use of Rappaport's DPSK

modulators/demodulators to perform the modulation/demodulation in Walley's system is the use of a known technique (DSPK) to improve a similar wireless system in the same way (to modulate/demodulate a signal).

347. Thus, Walley in view of Miyake, Gibson, and Rappaport renders obvious *spread spectrum receiver module is further configured to utilize differential phase shift keying (DPSK) to demodulate said audio signal representation*.

3. Claim 12

Claim 12. The wireless digital audio receiver of claim 10, wherein the spread spectrum receiver module is further configured to utilize differential phase shift keying (DPSK) to demodulate said audio signal representation.

348. It is my opinion that Walley in view of Miyake, Gibson and Rappaport renders obvious this claim.

349. Claim 12 requires the same limitation recited in claim 11, and thus, claim 12 is renders obvious for the same reasons as explained with respect to claim 11.

D. Ground 4: Walley In View of Miyake, Gibson, Rappaport and Drakoulis Renders Obvious Claims 1-5 and 8-12.

1. Overview of the combination; motivation to combine; expectation of success

350. Ground 4 relies on Walley in view of Miyake, Gibson, Rappaport and Drakoulis. A POSA would have been motivated to combine the teachings of Walley, Miyake, Gibson and Rappaport for the reasons provided in Ground 3.

351. As I explained above, I understand that, in another proceeding, Patent Owner argued proposed claims constructions for the terms “transmitter” and “audio source” (i.e., plain and ordinary meaning). EX1023, 4-9. I understand that Petitioner disagrees with those proposed constructions. However, for purposes of Ground 4 herein, I apply the constructions recited in Section VII for these terms to illustrate that the challenged claims are obvious in view of the cited prior art.

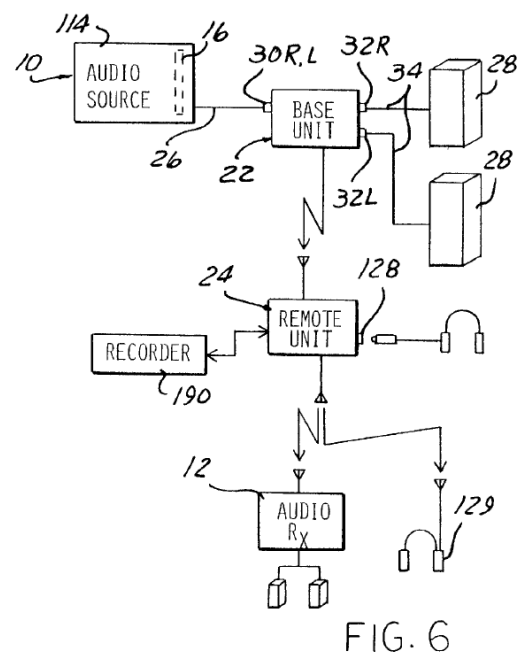
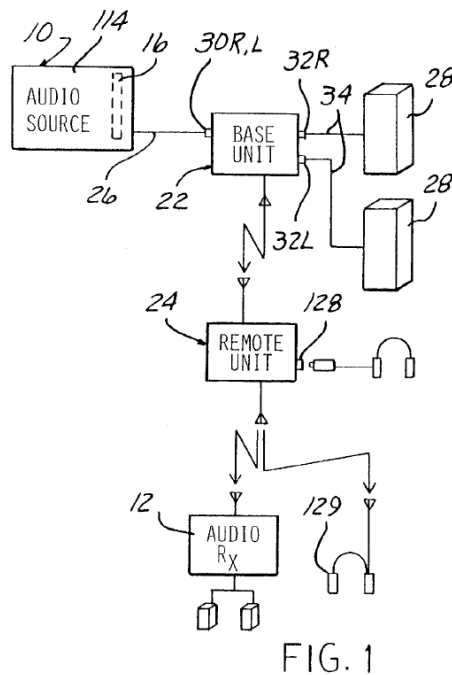
352. A POSA would additionally have been motivated to combine the teachings of Walley, Miyake, Gibson and Rappaport with Drakoulis. As explained in Sections III.C.3 and III.D.2.a, Walley teaches a CDMA spread spectrum controller which addresses the “different requirement” of “wireless communication electronics” such as headphones, speakers and phones, and teaches the transmission of music to these devices from “wireless units” or a “base unit.”

353. A POSA would additionally have been motivated to combine these teachings with Drakoulis. As I explained above, Walley teaches a CDMA spread spectrum controller which addresses the “different requirement” of “wireless communication electronics” such as “headphones, speakers and phones.”

354. As explained in Section VII, the term “transmitter” was previously construed to mean “a device that can be connected into an analog headphone jack to wirelessly transmit an audio signal” and the term “audio source” was previously construed to mean “a device for providing audio that has an analog headphone jack.”

Drakoulis teaches a *transmitter coupled to a music audio source* under these constructions.

355. Drakoulis is directed to an apparatus which “includes a **base unit 22** containing a **high frequency transmitter** and a remote unit 24 which is capable of receiving the high frequency transmitted signal.” EX1021, 5:27-5:33. “**As shown in FIG. 1**, the base unit 22 is adapted to be coupled via jacks or connectors and electrical conductors to the signal source 10.” EX1021, 5:34-37.



EX1021, FIGS. 1, 6.

356. Drakoulis teaches “[a]lthough not shown, a **stereo mini-input jack** and stereo mini-output jack may also be mounted on the housing of the base unit 22 for receiving mini plug connectors attached to cables.” EX1015, 5:56-60.

357. Drakoulis teaches that “suitable” “audio sources 10” include “a CD player, AM/FM tuner, tape deck, turntable, etc.” EX1015, 5:21-25. Drakoulis thus teaches *a device that can be connected into an analog headphone jack (base unit 22 through a stereo mini-input jack) to wirelessly transmit an audio signal*. Drakoulis further teaches *a device for providing audio that has an analog headphone jack (a CD player, AM/FM tuner, tape deck)*.

358. A POSA would have been motivated to combine Drakoulis’s transmitter (which can connect to an *audio source* through a headphone jack to wirelessly transmit audio from the *audio source*) with Walley because Walley teaches “generic type spread spectrum controllers which can be used in a variety of applications” and Drakoulis teaches a transmitter which can advantageously add wireless transmission capabilities to an existing, non-wireless audio source.

359. Moreover, it would be a simple substitution of one known element (Walley’s transmitter, such as a “wireless unit” or “base unit” capable of transmitting music) for another (Drakoulis’s transmitter, which is capable of transmitting music outputted from an audio source’s headphone jack) to obtain predictable results (a “wireless unit” or “base unit” capable of transmitting music outputted from an audio source’s headphone jack). A POSA would have had a reasonable expectation of success at combining Drakoulis’s “stereo mini-input jack” with Walley’s transmitters because Walley explains that “any manner of data could be substituted”

for the exemplary “continuous speech input” disclosed by Walley, and a stereo mini-input jack is a conventional component that is routinely added to provide audio input to a device.

2. Claims 1-5, 8-12

a. [1B], [2D], [3A], [3C], [3F], [5D], [8P]-[8B], [9B], [10P]-[10B]

360. As I explained above with respect to Section VII.CD.1, Drakoulis teaches a *transmitter* (base unit 22) *coupled to a music audio source* (CD player, AM/FM tuner, tape deck) under the constructions recited in §VII.

361. A POSA would have been motivated to combine Drakoulis’s transmitter (which connects to an *audio source*’s headphone jack to wirelessly transmit audio from the *audio source*) with Walley because Walley teaches “generic type spread spectrum controllers which can be used in a variety of applications” and Drakoulis teaches a transmitter which can advantageously add wireless transmission capabilities to a non-wireless audio source. *See* §III.F.1.

362. Walley in view of Miyake, Gibson, Rappaport and Drakoulis thus render obvious the *transmitter* (Walley’s music-transmitting wireless unit or base unit modified by Drakoulis to connect to a headphone jack) recited in [1B], [2D], [3A], [3C], [3F], [5D], [8P]-[8B], [9B], [10P]-[10B].

363. Limitation [3A] recites a “mobile digital audio transmitter,” limitations [8P] and [10P] recite a “transmitter...capable of being moved in any direction

during operation,” limitation [8A] recites a “mobile said transmitter.” These elements are rendered obvious by Walley’s music-transmitting wireless unit or base unit modified by Drakoulis to connect to a headphone jack because Drakoulis explains that its *transmitter* (base unit 22) “is provided with DC power from DC storage batteries 36 or by a conventional AC/DC adapter 38,” and thus, Drakoulis teaches a *mobile...transmitter* powered by batteries that is *capable of being moved in any direction during operation*. EX1021, 5:63-6:2, FIGS. 2, 3B.

b) The Remaining Limitations

364. Walley in view of Miyake, Gibson, Rappaport and Drakoulis render obvious the remaining limitations of claims 1-5 and 8-12 for the same reasons provided in Grounds 2 and 3.

Claim 1

[1P] A wireless digital audio spread spectrum receiver, capable of mobile operation, configured to receive a unique user code and a high quality audio signal representation with a frequency range of 20 Hz to 20 kHz from a digital audio spread spectrum transmitter, said audio signal representation representative of audio from a portable audio source, said digital audio spread spectrum receiver operative to communicate wirelessly with said digital audio spread spectrum transmitter, said digital audio spread spectrum receiver comprising:

365. I understand that this part of the claim is called the preamble. I also understand that there are special rules that apply to whether a preamble of a claim is a limitation or not. I have not been asked to apply those rules in my analysis. Instead,

I have been asked to presume that this is a limitation of the claims. I have done so.

366. It is my opinion that Walley in view of Miyake, Gibson, and Drakoulis renders obvious the preamble.

367. As I explained with respect to Ground 2, Walley in view of Miyake, Gibson, Rappaport and Drakoulis renders obvious [1P] (*wireless digital audio spread spectrum receiver, capable of mobile operation, configured to receive a unique user code and a high quality audio signal representation with a frequency range of 20 Hz to 20 kHz from a digital audio spread spectrum transmitter, said audio signal representation representative of audio from a portable audio source, said digital audio spread spectrum receiver operative to communicate wirelessly with said digital audio spread spectrum transmitter*) under the plain and ordinary meanings of “transmitter” and “audio source.”

368. The term “transmitter” should be construed to mean “a device that can be connected into an analog headphone jack to wirelessly transmit an audio signal” and the term “audio source” should be construed to mean “a device for providing audio that has an analog headphone jack.” §II.C. As explained in Section VIII.C.1, Drakoulis teaches a *transmitter* (base unit 22) *coupled to a music audio source* (CD player, AM/FM tuner, tape deck) under these constructions.

369. A POSA would have been motivated to combine Drakoulis’s transmitter (which connects to an *audio source*’s headphone jack to wirelessly

transmit audio from the *audio source*) with Walley because Walley teaches “generic type spread spectrum controllers which can be used in a variety of applications” and Drakoulis teaches a transmitter which can advantageously add wireless transmission capabilities to a non-wireless audio source. *See* §VIII.C.1.

Walley in view of Miyake, Gibson, Rappaport and Drakoulis thus render obvious a *wireless digital audio spread spectrum receiver, capable of mobile operation*, (Walley’s phone, speaker or headphones) *configured to receive a unique user code* (Walley’s spreading code combined with Miyake’s user-specific code) *and a high quality audio signal representation with a frequency range of 20 Hz to 20 kHz* (Walley’s 20 Hz to 20 kHz audio and high-fidelity music) *from a digital audio spread spectrum transmitter* (Walley’s music-transmitting wireless unit or base unit modified by Drakoulis to connect to a headphone jack), *said audio signal representation representative of audio from a portable audio source* (Drakoulis’s CD player, radio or tape deck), *said digital audio spread spectrum receiver operative to communicate wirelessly with said digital audio spread spectrum transmitter*.

370. Elements [1A]-[1F] and claims 2, 7 and 10 are obvious for the same reasons that I set forth in Ground 2 with respect to the same elements and claims.

3. Claims 3-4, 8, 11

371. As I explained above with respect to Ground 2, [3P] corresponds to [1P], and thus, [3P] is rendered obvious by the combination of Walley, Miyake,

Gibson, Rappaport and Drakoulis for the same reasons set forth above.

372. Elements [3A]-[3F] and claims 4, 8 and 11 are obvious for the same reasons as set forth in Ground 2 with respect to the same elements and claims.

4. Claims 5-6, 9, 12

373. Assuming claim 5's preamble is limiting, Walley in view of Miyake, Gibson, Rappaport and Drakoulis renders obvious the preamble.

374. As I explained above with respect to Ground 2, Walley in view of Miyake and Gibson renders obvious [5P] (*wireless digital coded audio spread spectrum transmitter* (Walley's "base unit" or for a "wireless unit[]" (such as a phone)) *operatively coupled to a portable audio player* (Walley's audio source) *and configured to transmit a unique user code* (Walley's spreading code combined with Miyake's user-specific code) *and a representation of an audio signal with a frequency range of 20 Hz to 20 kHz* (Walley's 20 Hz to 20 kHz audio and high-fidelity music), *wherein said digital coded audio spread spectrum transmitter is configured to wirelessly communicate with a digital audio spread spectrum receiver and is configured to be moved in any direction during operation.*

375. As explained with respect to [1P], under the constructions for "transmitter" and "audio source" set forth in §VII above, Walley in view of Miyake, Gibson, Rappaport and Drakoulis renders obvious *digital audio spread spectrum transmitter* (Walley's "base unit" or "wireless units" modified by Drakoulis to

connect to a headphone jack) which transmits *audio from a portable audio source* (e.g., Drakoulis's CD player, radio or tape deck). A POSA would understand that Walley's transmitter (modified by Drakoulis) would connect to Drakoulis's audio source via a headphone jack, and renders obvious *transmitter operatively coupled to a portable audio player*.

376. Elements [5A]-[5D] and claims 6, 9 and 12 are obvious for the same reasons as set forth in Ground 2 with respect to those elements and claims.

IX. CONCLUSION

377. For the foregoing reasons, it is my opinion that claims 1-12 are invalid in view of Grounds 1-4.

X. DECLARATION IN LIEU OF OATH

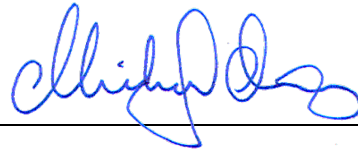
378. I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under § 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon. If called to testify as to the truth of the matters stated herein, I could and would testify competently.

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

IPR2025-01541
U.S. Patent No. 9,107,000

Declaration of Michael Allan Martin Davies

Date: September 17, 2025



Michael Allan Martin Davies

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