

**UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE PATENT TRIAL AND APPEAL BOARD**

Sony Corporation,
Petitioner,

v.

One-E-Way, Inc.
Patent Owner.

Patent No. 7,865,258

Issue Date: January 4, 2011

Title: Wireless Digital Audio System

EXHIBIT 1011

**COMPARISON OF 2008 APPLICATION SPECIFICATION
AND SPECIFICATION OF PATENT NO. 7,865,258
AS ORIGINALLY FILED**

No. IPR2018-00216

On the following pages, the as-filed specification of U.S. App. No. 12/144,729, filed on July 12, 2008 (“the 2008 specification”) is compared to the as-filed specification of U.S. App. No. 12/570,343, filed on Sept. 30, 2009, and issued as the ’258 patent (“the 2009 specification”). Blue underlined text appears in the 2009 specification but not in the 2008 specification. Red text in strikeout appears in the 2008 specification but not in the 2009 specification.

WIRELESS DIGITAL AUDIO MUSIC SYSTEM

This continuation application claims the benefit of U.S. Patent Application Serial No. [12/144,729](#) filed July 12, 2008, which claimed benefit of U.S. Patent Application Serial No. [10/648,012](#) filed August 26, 2003, which claimed benefit from ~~from~~ U.S. Patent Application Serial No. 10/027,391, filed December 21, 2001, for “Wireless Digital Audio System,” published under US 2003/0118196 A1 on June 26, 2003, now abandoned, both of which are incorporated herein in their entirety by reference.

BACKGROUND OF THE INVENTION

[0001] This invention relates to audio player devices and more particularly to systems that include headphone listening devices. The new audio system uses an existing headphone jack (i.e., this is the standard analog headphone jack that connects to wired headphones) of a music audio player (i.e., portable CD player, portable cassette player, portable A.M./F.M. radio, laptop/desktop computer, portable MP3 player, and the like) to connect a battery powered transmitter for wireless transmission of a signal to a set of battery powered receiving headphones.

[0002] Use of audio headphones with audio player devices such as portable CD players, portable cassette players, portable A.M./F.M. radios, laptop/desktop computers, portable MP3 players and the like have been in use for many years. These systems incorporate an audio source having an analog headphone jack to which headphones may be connected by wire.

[0003] There are also known wireless headphones that may receive A.M. and F.M. radio transmissions. However, they do not allow use of a simple plug in (i.e., plug in to the existing analog audio headphone jack) battery powered transmitter for connection to any music audio player device jack, such as the above mentioned music audio player devices, for coded wireless transmission and reception by headphones of audio music for private listening without interference where multiple users occupying the same space are operating wireless transmission devices. Existing audio systems make use of electrical wire connections between the audio source and the headphones to accomplish private listening to multiple users.

[0004] There is a need for a battery powered simple connection system for existing music audio player devices (i.e., the previously mentioned music devices), to allow coded digital wireless transmission (using a battery powered transmitter) to a headphone receiver (using a battery powered receiver headphones) that accomplishes private listening to multiple users occupying the same space without the use of wires.

SUMMARY OF THE INVENTION

[0005] The present invention is generally directed to a wireless digital audio system for coded digital transmission of an audio signal from any audio player with an analog headphone jack to a receiver headphone located away from the audio player. Fuzzy logic technology may be utilized by the system to enhance bit detection. A battery-powered digital transmitter may include a headphone plug in communication with any suitable music audio source. For reception, a battery-powered headphone receiver may use embedded fuzzy logic to enhance user code bit detection. Fuzzy logic detection may be used to enhance user code bit detection during decoding of the transmitted audio signal. The wireless digital audio music system provides private listening without interference from other users or wireless devices and without the use of conventional cable connections.

[0006] These and other features, aspects and advantages of the present invention will become better understood with reference to the following drawings, description and claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[0007] Some aspects of the present invention are generally shown by way of reference to the accompanying drawings in which:

Figure 1 schematically illustrates a wireless digital audio system in accordance with the present invention;

Figure 2 is a block diagram of an audio transmitter portion of the wireless digital audio system of Fig. 1.;

Figure 3 is a block diagram of an audio receiver portion of the wireless digital audio system of Fig. 1; and

Figure 4 is an exemplary graph showing the utilization of an embedded fuzzy logic coding algorithm according to one embodiment of the present invention.

DETAILED DESCRIPTION

[0008] The following detailed description is the best currently contemplated modes for carrying out the invention. The description is not to be taken in a limiting sense, but is made merely for the purpose of illustrating the general principles of the invention.

[0009] Referring to Figures 1 through 3, a wireless digital audio music system 10 may include a battery powered transmitter 20 connected to a portable music audio player or music audio source 80. The battery powered wireless digital audio music transmitter 20 utilizes an analog to digital converter or ADC 32 and may be connected to the music audio source 80 analog headphone jack 82 using a headphone plug 22. The battery powered transmitter 20 may have a transmitting antenna 24 that may be omni-directional for transmitting a spread spectrum modulated signal to a receiving antenna 52 of a battery powered headphone receiver 50. The battery powered receiver 50 may have headphone speakers 75 in headphones 55 for listening to the spread spectrum demodulated and decoded communication signal. In the headphone receiver 50, fuzzy logic detection may be used to optimize reception of the received user code. The transmitter 20 may digitize the audio signal using ADC 32. The digitized signal may be processed downstream by an encoder 36. After digital conversion, the digital signal may be processed by a digital low pass filter. To reduce the effects of channel noise, the battery powered transmitter 20 may use a channel encoder 38. A modulator 42 modulates the digital signal to be transmitted. For further noise immunity, a spread spectrum DPSK (differential phase shift key) transmitter or module 48, is utilized. The battery powered transmitter 20 may

contain a code generator 44 that may be used to create a unique user code. The unique user code generated is specifically associated with one wireless digital audio system user, and it is the only code recognized by the battery powered headphone receiver 50 operated by a particular user. The radio frequency (RF) spectrum utilized (as taken from the Industrial, Scientific and Medical (ISM) band) may be approximately 2.4 GHz. The power radiated by the transmitter adheres to the ISM standard.

[0010] Particularly, the received spread spectrum signal may be communicated to a 2.4 GHz direct conversion receiver or module 56. Referring to Figures 1 through 4, the spread spectrum modulated signal from transmit antenna 24 may be received by receiving antenna 52 and then processed by spread spectrum direct conversion receiver or module 56 with a receiver code generator 60 that contains the same transmitted unique code, in the battery powered receiver 50 headphones. The transmitted signal from antenna 24 may be received by receiving antenna 52 and communicated to a wideband bandpass filter (BPF). The battery powered receiver 50 may utilize embedded fuzzy logic 61 (as graphically depicted in Figures 1, 4) to optimize the bit detection of the received user code. The down converted output signal of direct conversion receiver or module 56 may be summed by receiver summing element 58 with a receiver code generator 60 signal. The receiver code generator 60 may contain the same unique wireless transmission of a signal code word that was transmitted by audio transmitter 20 specific to a particular user. Other code words from wireless digital audio systems 10 may appear as noise to audio receiver 50. This may also be true for other device transmitted wireless signals operating in the wireless digital audio spectrum of digital audio system 10. This code division multiple access (CDMA) may be used to provide each user independent audible enjoyment. The resulting summed digital signal from receiving summary element 58 and direct conversion receiver or module 56 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 audio transmitter 20. A source decoder 68 may further decode the coding applied by encoder 36.

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