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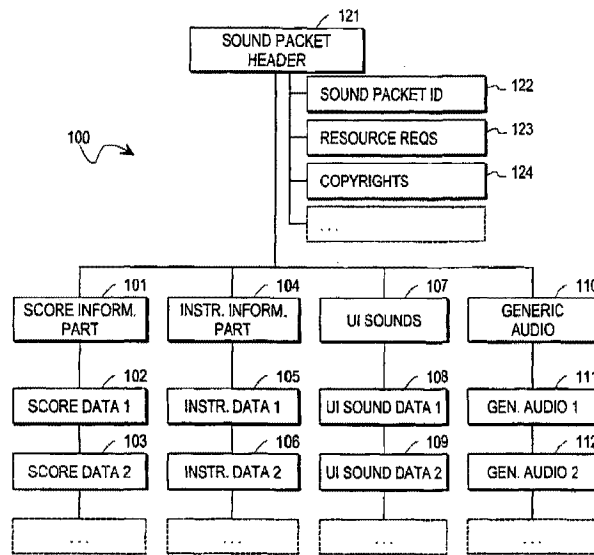
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(54) Title: METHOD AND ARRANGEMENT FOR PROVIDING CUSTOMIZED AUDIO CHARACTERISTICS TO CELLULAR TERMINALS



(57) Abstract: A method is provided for downloading audio characteristics to terminal equipment. A score information part (101, 302, 303) is provided describing the presentation instructions of an audible signal. An instrument information part (104, 305, 306) is also provided describing the parameters for synthesizing an audible signal the presentation instructions of which is described by said score information part. Additionally some compatibility information (123, 210, 211, 212, 220, 315) is provided describing the compatibility of said score information part and said instrument information part with certain processing and storing capacity. As a response to a selection command (411, 418), (412, 419) said score information part and said instrument information part are downloaded to terminal equipment through a communication network.



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Method and arrangement for providing customized audio characteristics to cellular terminals

5 The invention concerns generally the technological field of furnishing terminal equipment of communication systems with selectable audio characteristics. Especially the invention concerns a method and arrangement for providing a large degree of selectability to individual users concerning ringing tones and other sounds emitted by their terminal equipment.

10 Portable terminals of cellular radio systems have conventionally been mobile telephones, but the development trend at the priority date of this patent application is towards more versatile terminal equipment with features from e.g. palmtop computers, telephones, positioning devices and personal digital assistants (PDAs). The conventional way of producing a ringing tone in a portable terminal is to use a
15 buzzer which is optimized for efficiency in producing a high output sound pressure level. The buzzers that are most commonly used only accept a single square wave as an input waveform. A square input wave on a constant frequency gives rise to a monophonic output buzz with constant pitch. It is possible to play simple monophonic melodies with the buzzer by composing the input signal as a sequence of relatively short square wave trains. It is possible to use the loudspeaker of the
20 mobile terminal to emit more versatile sounds, but in practice it may be difficult to obtain a reasonably high output sound pressure level without sacrificing compact size, efficiency in energy consumption and usability in the telephone mode.

Manufacturers have conventionally provided their mobile terminals with a selection of alternative ringing tones by storing a number of different buzzer input sequences
25 into the terminal's memory. A user can select one of these preprogrammed tones by performing a simple programming step. Practical experience has shown that consumers are eager to personalize their mobile terminals according to their own taste, which has led to a phenomenal success of services that sell downloadable ringing tones. The known method of downloading a ringing tone from a network
30 requires the user to send an SMS message (Short Messaging Services) to a certain ringing tone server coupled to the fixed parts of the cellular network, said message indicating the user's willingness to download a new ringing tone and preferably also identifying a particular melody which the user is interested in. The server responds with a specifically formatted SMS message that contains machine-readable

instructions which the portable terminal can use to reproduce the ringing tone in question.

Although the selectability and downloading services described above has concentrated on ringing tones, it would be possible to use similar methods and arrangements to select personal tones or melodies for all occasions when the portable terminal emits an indicator audio signal. Such occasions comprise but are not limited to indicator tones for key depressing, alarm sounds for battery depletion and other threatening events as well as amusing sounds for games.

The drawbacks of the prior art arrangements for providing selectability to portable terminals' audio characteristics are related to the limited sound reproduction capability on one hand and to the shortage of various resources on the other. With resources we mean the memory space and allocatable processing capability of the portable terminal itself as well as the allocatable transmission resources between the terminal and the fixed parts of the cellular radio network. We will illustrate the resource question with some examples.

At the priority date of this patent application one of the most popular ways of distributing arbitrary high quality audio sequences in electronic form is MP3 or MPEG-2 Layer 3 coded audio, where MPEG originally comes from Motion Picture Experts Group. The MP3 audio encoding is based on a method where an original audio sequence is recorded, digitized and compressed by performing a number of mathematical transformations on short consecutive frames of the digitized signal. One minute of MP3 encoded audio signal results in approximately 8 Mbits of data depending on the used compression rate. If we set the minimum temporal length of a ringing tone at ten seconds, a single melody would require over 1.3 Mbits of memory when stored. This is far too much regarding the limited amount of memory allocatable to ringing tones in known portable terminals. The downloading of such a ten-second audio sequence over the known GSM (Global System for Mobile telecommunications) digital cellular network at 9.6 kbit/s would take well over two minutes, which is unacceptable in terms of network loading and communication cost. Decoding an MP3 encoded bitstream into a form suitable for playback requires quite intensive processing.

At the priority date of this patent application there is one portable terminal on the market, known by the registered trademark "Nokia 9110 Communicator" of Nokia Corporation, that supports the playback of arbitrary audio tones encoded by Pulse Code Modulation or PCM. A typical 8-bit PCM encoded wave file that represents

ten seconds of emitted signal with relatively low audio quality has the size of 640 kbits. Although this is considerably less than what is required by the MP3 encoded sequence, it is still too much for large-scale downloading.

5 It is an object of the present invention to provide a method and an arrangement for offering a wide variety of selectable audio characteristics to the users of terminal equipment with reasonable requirements concerning memory space, processing capability and transmission resources. It is a further object of the invention to provide compatibility of the method and arrangement with a large selection of terminal types and operating software. An additional object of the invention is to
10 make it easy for the user to tailor the audio characteristics of terminal equipment according to personal taste.

The objects of the invention are achieved by presenting audio sequences in a form with a score information part and an instrument information part. The instrument information part contains synthesis parameters that define the timbre, or the
15 synthesized sound or sequence of sounds. The score information part contains instructions that define the usage of the instrument information. Additionally there is provided compatibility information describing the compatibility of such audio sequences with known terminal capabilities.

The method according to the first embodiment of the invention is characterized in
20 that it comprises the steps of

- providing a score information part describing the presentation instructions of an audible signal,
- providing an instrument information part describing the parameters for synthesizing an audible signal the presentation instructions of which is described by
25 said score information part,
- providing compatibility information describing the compatibility of said score information part and said instrument information part with certain processing and storing capacity and
- as a response to a selection command, downloading said score information part
30 and said instrument information part to terminal equipment through a communication network.

The method according to the second embodiment of the invention is characterized in that it comprises the steps of

- indicating the type of terminal equipment to a network,

- receiving from the network information concerning available score information parts, each of them describing the presentation instructions of an audible signal, and instrument information parts, each of them describing the parameters for synthesizing an audible signal the presentation instructions of which is described by a score information part,
- 5 - indicating at least one score information part and at least one instrument information part from said available score information parts and instrument information parts as selected, and
- receiving the score information part and the instrument information part indicated
- 10 as selected from the network.

The invention also applies to an apparatus which comprises a network device. It is characterized in that the network device comprises

- a database of score information parts, each score information part describing the presentation instructions of an audible signal,
 - 15 - a database of instrument information parts, each instrument information part describing the parameters for synthesizing an audible signal the presentation instructions of which is described by a score information part,
 - compatibility information associated with said score information parts and instrument information parts, describing the compatibility of said score information
 - 20 parts and said instrument information parts with certain processing and storing capacity and
 - means for responding to a selection command by downloading a score information part and a instrument information part to terminal equipment through a communication network.
- 25 According to the invention a service provider or a similarly acting other body maintains a database that comprises a plurality of sound packets. A sound packet is understood in this context as an entity that comprises a piece of musical score information and a set of parameters that relate to the "instruments" or synthesized sound sources which should be used to play the score. A sound packet is preferably
- 30 self-contained in the sense that once it has been loaded into terminal equipment with appropriate processing and audio outputting capabilities, it enables the terminal to output a certain passage of audio signal where the synthesized sounds described by the parameters perform the presentation written into the score information. Said database contains also information about the compatibility of the stored sound
- 35 packets with the capabilities of known terminal types. For downloading into a

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