

METHOD AND CORRESPONDING DEVICE FOR TRANSMITTING MOBILE MULTIMEDIA BROADCAST PROGRAM PROMPT INFORMATION

TECHNICAL FIELD

The present invention relates to a mobile multimedia broadcasting system and a mobile phone television terminal thereof, and in particular to a method and a device for transmitting mobile multimedia broadcast program prompt information.

BACKGROUND

The Electronic Service Guide (ESG) of a China Mobile Multimedia Broadcasting (CMMB) system is a multimedia broadcast information guide service. A terminal user can obtain information related to the multimedia broadcast service through the ESG, such as service name, playing time and summary, etc., which is convenient to the user for rapid searching, previewing and accessing. The ESG provides a fine navigation mechanism for the user to watch television program and enjoy information service, and enables the user to find an interested program conveniently and rapidly and view additional information of the program.

The functions of the ESG have become important ways and tools for a user to watch program. A plurality of value-added services can be provided by the ESG, so as to utilize the user group of the ESG completely and create large income for the operator. Along with the enrichment of ESG information, the effective organization and dispatching of the ESG information become an important task.

In the mobile multimedia broadcasting system, the ESG comprises basic description information, data information and program prompt information. The program prompt information describes summary information of programs played at each time section of mobile multimedia broadcast services. And the program prompt information is encapsulated into a data unit of a data segment of a service information multiplex subframe and transmitted along with mobile multimedia broadcast video and audio services, as shown in Fig. 1.

The program prompt information mainly comprises the starting time, duration, theme, length and other information of a current program in N records (from record 0 to record N-1). The structure of the program prompt information is as shown in Fig. 2. And a program schedule in recent time can be informed to a user through the program prompt information promptly.

In the prior art, a terminal receives a multiplex frame transmitted over a broadcast channel every second, parses the multiplex frame, extracts program prompt information from it and then displays the program prompt information to a user.

However, due to various reasons, the terminal cannot play program well and the user experience is poor at present.

SUMMARY

The technical problem to be solved by the present invention is to provide a method and a corresponding device for transmitting mobile multimedia broadcast program prompt information, so as to improve both the efficiency and performance of a mobile communication terminal in processing program prompt information without affecting the play effect.

To solve the problem above, the present invention provides a method for transmitting mobile multimedia broadcast program prompt information, comprising:

transmitting program prompt information at regular time by a network front end; when program information data in the program prompt information needs to be updated, refreshing data update mark information used to identify a data update in the program prompt information while updating the program information data, encapsulating the program prompt information into a data segment of a multiplex subframe, and transmitting a service information multiplex frame composed of the multiplexing subframes.

Furthermore, the network front end may preset an initial value of the data update mark information; the initial value may be predetermined by the network front end and

a mobile communication terminal;

the refreshing of the data update mark information may be changing the data update mark information into different values.

Furthermore, a manner of identifying the data update mark information may be: identifying by a value of a cyclic redundancy check (CRC) field of the program prompt information, or identifying by a value of an update sequence number field after expanding the update sequence number field in the program prompt information; the identifying manner may be predetermined by the network front end and the mobile communication terminal.

To solve the problem above, the present invention also provides a method for receiving mobile multimedia broadcast program prompt information, comprising:

receiving a service information multiplex frame at regular time by a mobile communication terminal, parsing the multiplex frame and extracting data update mark information in program prompt information from a data segment of a multiplex subframe, judging whether program information data in the program prompt information has been updated according to the data update mark information, and parsing and extracting the program information data and storing it when determining that the program information data has been updated.

Furthermore, the mobile communication terminal may store an initial value of the data update mark information predetermined together with a network front end;

the judging whether the program information data has been updated according to the data update mark information may be: when currently extracted and received data update mark information is not equal to the initial value, determining that the program information data has been updated; or comparing currently extracted and received data update mark information with formerly stored data update mark information, if the two are not equal, then determining that the program information data has been updated.

Furthermore, a manner of identifying the data update mark information may be:

identifying by a value of a CRC field of the program prompt information, or identifying by a value of an update sequence number field after expanding the update sequence number field in the program prompt information; the identifying manner may be predetermined by the mobile communication terminal and the network front end.

Furthermore, the mobile communication terminal may display the program information data when storing currently parsed and extracted program information data.

To solve the problem above, the present invention also provides a front end device for transmitting mobile multimedia broadcast program prompt information, comprising a program prompt information updating module and a multiplexing processing transmitting module connected with each other; wherein,

the program prompt information updating module is arranged for, when program information data in program prompt information needs to be updated, refreshing data update mark information used to identify a data update in the program prompt information while updating the program information data, and outputting the program prompt information to the multiplexing processing transmitting module;

the multiplexing processing transmitting module is arranged for transmitting program prompt information at regular time; when the program prompt information updating module outputs the program prompt information, encapsulating the program prompt information into a data segment of a multiplex subframe of a service multiplex frame and storing the program prompt information, and transmitting the service multiplex frame composed of the multiplexing subframes.

Furthermore, the program prompt information updating module may be arranged for presetting an initial value of the data update mark information, the initial value may be predetermined by the network front end and a mobile communication terminal; and the refreshing of the data update mark information may be changing the data update mark information into different values.

Furthermore, the program prompt information updating module may be arranged for setting a value of a CRC field of the program prompt information as an identifier of the

data update mark information; or expanding an update sequence number field in the program prompt information and setting a value of the sequence number field as an identifier of the data update mark information; the identifier of the data update mark information may be predetermined by the front end device and a mobile communication terminal.

To solve the problem above, the present invention also provides a mobile communication terminal device for receiving mobile multimedia broadcast program prompt information, comprising a receiving module and a parsing processing module connected with each other; wherein,

the receiving module is arranged for receiving a service information multiplex frame at regular time through a broadcast network and outputting the service information multiplex frame to the parsing processing module;

the parsing processing module is arranged for parsing an input service information multiplex frame, parsing a data segment of a multiplex subframe and extracting data update mark information in program prompt information from the data segment of the multiplex subframe, judging whether program information data in the program prompt information has been updated according to the data update mark information, and parsing and extracting the program information data and storing it when determining that the program information data has been updated.

Furthermore, the parsing processing module may be arranged for storing an initial value of the data update mark information predetermined together with a network front end; determining that the program information data has been updated when currently extracted and received data update mark information is not equal to the initial value; or comparing currently extracted and received data update mark information with formerly stored data update mark information and determining that the program information data has been updated if the two are not equal.

Furthermore, the parsing processing module may be arranged for setting a value of a CRC field of the program prompt information as an identifier of the data update mark

information; or expanding an update sequence number field in the program prompt information and setting a value of the sequence number field as an identifier of the data update mark information; the identifier of the data update mark information may be predetermined by the mobile communication terminal and a front end device.

Furthermore, the device may comprise a displaying module connected to the parsing processing module, wherein,

the parsing processing module may be arranged for outputting currently parsed and extracted program information data to the displaying module while storing the currently parsed and extracted program information data; and

the displaying module may be arranged for displaying the input program information data.

Compared with the prior art, the present invention judges whether program prompt information needs to be updated by setting data update mark information, updates, parses and displays the program prompt information only when it needs to be updated. Thus, the present invention greatly improves both the efficiency in processing program prompt information and performance of a mobile communication terminal, enhances the playback effect and upgrades the user experience noticeably.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a schematic diagram of transmission of program prompt information carried in a data unit of a CMMB multiplex subframe;

Fig. 2 is a structural diagram of program prompt information;

Fig. 3 is a structural diagram of expanding of program prompt information according to the present invention;

Fig. 4 is a flowchart of a method for transmitting program prompt information by a network front end according to an embodiment of the present invention;

Fig. 5 is a flowchart of a method for receiving program prompt information by a

mobile communication terminal according to an embodiment of the present invention;

Fig. 6 is a structural diagram of a front end device for transmitting program prompt information according to an embodiment of the present invention; . and

Fig. 7 is a structural diagram of a terminal device for receiving program prompt information according to an embodiment of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

Program prompt information is sent to a mobile communication terminal through a broadcast network cyclically in a program playing process. The mobile communication terminal parses a data segment in a received multiplex frame every second to obtain the program prompt information and displays it. Thus, it not only causes the mobile communication terminal to do much useless repeated processing which results in the decreasing of performance thereof, but also affects the program play effect which results in bad user experience.

The main idea of a method and a corresponding device for transmitting mobile multimedia broadcast program prompt information of the present invention is that: a network front end refreshes a value of a data update mark field used to identify a data update in program prompt information correspondingly after updating data of the program prompt information of a mobile multimedia broadcast service, and then encapsulates the program prompt information into a data segment of a multiplex subframe of a multiplex frame and sends it ; the mobile communication terminal parses the multiplex frame after receiving it and reads the value of the data update mark field in the program prompt information to judge whether the program prompt information data has been updated, if updated, parsing and displaying the received program prompt information data, in this way, the efficiency of the mobile communication terminal in processing program prompt information and its performance can be improved and the user experience can be enhanced.

To describe the technical solution of the present invention clearly, the main idea of

the present invention will be described hereinafter with reference to the drawings and preferable embodiments in detail.

The following description is based on a CMMB protocol system, but it is only arranged for explaining the invention, not meaning that the present invention is limited to the CMMB protocol system. Actually, the present invention is adaptive to any mobile multimedia broadcasting system which transmits control information and service information separately.

In order to realize the method for processing program prompt information of the present invention, a 32-bit Cyclic Redundancy Check (CRC) 32 field in the program prompt information is needed to be used as a necessary mark for judging whether the program prompt information data has been updated. The CRC32 is used for checking whether the data is right. The value of the CRC32 changes as data in the program prompt information changes; therefore, the change of the data is judged based on whether the CRC32 values are equal. Or, expanding of an update sequence number field in the program prompt information is performed, as shown in Fig. 3, for example, a reserved bit is used as a necessary mark for judging whether the program prompt information has been updated.

Fig. 4 is a flowchart of a method for transmitting program prompt information according to an embodiment of the present invention. The flowchart is executed by a network front end, comprising the following steps:

Step 401: judging whether program information data in program prompt information needs to be updated; if it does, executing Step 402; otherwise, executing Step 405.

Steps 402-404: updating the program information data, refreshing data update mark information used to identify a data update in the program prompt information, and then encapsulating the program prompt information into a data segment of a multiplex subframe of a service information multiplex frame.

The data update mark information in the program prompt information can be

identified in two manners:

one is identifying by a value of the CRC32 field, and the other is identifying by a value of an expanded update sequence number field in the program prompt information, as shown in Fig. 3. And the identifying manners are predetermined by the front end and the mobile communication terminal.

An initial value which is agreed on in advance by the mobile communication terminal needs to be set for the data update mark information, such as 0. The refreshing of the data update mark information means moving the data update mark information by a predetermined unit length, such as adding 1 in this embodiment.

Step 405: transmitting the service information multiplex subframe at regular time and finishing the flow.

Fig. 5 shows a flowchart of a method for receiving program prompt information according to an embodiment of the present invention, and the flowchart is executed by the mobile communication terminal, comprising the following steps:

Step 501: presetting a data update variable=0, and storing it locally.

Steps 502-504: receiving the service information multiplex frame at regular time, parsing the data segment of the multiplex subframe and extracting the data update mark information in the program prompt information.

Steps 505-508: comparing a data update variable stored locally with the data update mark information in the program prompt information; if the two are not equal, indicating that the network front end has updated the program information data in the program prompt information, then parsing, extracting and storing the program information data, displaying the content of the updated program information data, setting the locally stored data update variable = the data update mark information in the program prompt information, and returning to Step 502; otherwise, indicating that the network front end does not update the program information data, and there is no need to parse and extract the program information data, and then returning to Step 502 directly;

finishing the process until the mobile multimedia broadcast service is finished. The parsed and extracted program information data comprises the starting time, duration, theme, length and other information of the current program.

For example, the mobile communication terminal compares a locally stored data update variable with a value of the CRC32 field in the program prompt information, or compares a locally stored data update variable with a value of the expanded update sequence number field in the program prompt information; if they are not equal, the mobile communication terminal parses and extracts the program information data in the program prompt information and stores it, displays the content of the parsed and extracted program information data at regular time, and then sets the locally stored data update variable = the value of the CRC32 field in the program prompt information, or sets the locally stored data update variable = the value of the expanded update sequence number field in the program prompt information.

Actually, the mobile communication terminal stores the initial value of the data update mark information predetermined together with the front end; at first, when determining that data update mark information in received program prompt information is not equal to the initial value, the mobile communication terminal may determine that the program information data in the program prompt information has been updated, then parses and extracts the updated program information data, and stores the received program prompt information. The program prompt information comprises the program information data and the data update mark information. Hereafter, data update mark information in new received program prompt information is compared with formerly stored data update mark information at each time so as to judge whether the program information data has been updated, and the whole program prompt information will be updated and stored once the data is updated.

The present invention correspondingly provides a network front end device embodiment for transmitting program prompt information, as shown in Fig. 6. The front end device 600 comprises a program prompt information updating module 610 and a multiplexing processing transmitting module 620 connected with each other.

Wherein, the program prompt information updating module 610 is arranged for updating program information data when the program information data in program prompt information needs to be updated, refreshing data update mark information used to identify a data update in the program prompt information, and then outputting the program prompt information to the multiplexing processing transmitting module 620.

The data update mark information in the program prompt information is identified by a value of a CRC32 field, or identified by a value of an expanded update sequence number field in the program prompt information.

An initial value which is agreed on in advance by the mobile communication terminal needs to be set for the data update mark information, such as 0. The refreshing of the data update mark information means changing the data update mark information into different values, such as adding 1 in this embodiment.

The multiplexing processing transmitting module 620 is arranged for encapsulating the input program prompt information into a data segment of a multiplex subframe, and transmitting the service information multiplex frame composed of multiplex subframes at regular time.

The invention correspondingly provides a mobile communication terminal device embodiment for receiving program prompt information, as shown in Fig. 7. The mobile communication terminal 700 comprises a receiving module 710, a parsing processing module 720 and a displaying module 730 connected in order.

Wherein the receiving module 710 is arranged for receiving a service information multiplex frame at regular time through a broadcast network and outputting the received service information multiplex frame to the parsing processing module 720.

The parsing processing module 720 is arranged for predefining and storing a data update variable, parsing the input service information multiplex frame data, extracting data update mark information in the program prompt information from a data segment of a multiplex subframe, and comparing the stored data update variable with the extracted data update mark information; if the two are not equal, parsing and extracting the

program information data in the program prompt information and storing it, and outputting it to the displaying module 730, then setting the locally stored data update variable = the data update mark information in the program prompt information.

The program information data comprises information data including the starting time, duration time, theme and length of the current program.

Actually, when determining that the data update mark information in the received program prompt information is not equal to the initial value, the parsing processing module 720 can determine that the program information data in the program prompt information has been updated, then parses and extracts the updated program information data and stores the received program prompt information. The program prompt information comprises program information data and data update mark information. Data update mark information in new received program prompt information is compared with formerly stored data update mark information at each time so as to judge whether the program information data has been updated and the whole program prompt information will be updated and stored once the data is updated.

The displaying module 730 is arranged for displaying the program information data content input by the parsing processing module 720.

The present invention solves the defect of traditional technical solutions. The mobile communication terminal judges whether program prompt information data has been updated by the network front end through setting data update mark information in the program prompt information, parses and displays the updated program prompt information when the data has been updated. Thus, both the efficiency of the mobile communication terminal in processing program prompt information and its performance are improved, the playback effect is enhanced, and the user experience is noticeably upgraded.

Certainly, the present invention may comprise other embodiments. Those skilled in the art can make various modifications and changes correspondingly based on the present invention without departing from the spirit and principle of the present invention,

and these corresponding modifications and changes should be within the protection scope of the claims of the present invention.

CLAIMS

1. A method for transmitting mobile multimedia broadcast program prompt information, comprising:

transmitting, by a network front end, program prompt information at regular time;

when program information data in the program prompt information needs to be updated, refreshing data update mark information used to identify a data update in the program prompt information while updating the program information data, encapsulating the program prompt information into a data segment of a multiplex subframe, and transmitting a service information multiplex frame composed of the multiplex subframes.

2. The method according to claim 1, wherein the network front end presets an initial value of the data update mark information; the initial value is predetermined by the network front end and a mobile communication terminal;

the refreshing of the data update mark information is changing the data update mark information into different values.

3. The method according to claim 1 or 2, wherein a manner of identifying the data update mark information is: identifying by a value of a cyclic redundancy check (CRC) field of the program prompt information, or identifying by a value of an update sequence number field after expanding the update sequence number field in the program prompt information; the identifying manner is predetermined by the network front end and the mobile communication terminal.

4. A method for receiving mobile multimedia broadcast program prompt information, comprising:

receiving, by a mobile communication terminal, a service information multiplex frame at regular time, parsing a data segment of a multiplex subframe and extracting data update mark information in program prompt information from the data segment of the multiplex subframe, judging whether program information data in the program prompt information has been updated according to the data update mark information, and

parsing and extracting the program information data and storing it when determining that the program information data has been updated.

5. The method according to claim 4, wherein the mobile communication terminal stores an initial value of the data update mark information predetermined together with a network front end;

judging whether the program information data has been updated according to the data update mark information is: when currently extracted and received data update mark information is not equal to the initial value, determining that the program information data has been updated; or comparing currently extracted and received data update mark information with formerly stored data update mark information, if the two are not equal, then determining that the program information data has been updated.

6. The method according to claim 4, wherein a manner of identifying the data update mark information is: identifying by a value of a CRC field of the program prompt information, or identifying by a value of an update sequence number field after expanding the update sequence number field in the program prompt information; the identifying manner is predetermined by the mobile communication terminal and the network front end.

7. The method according to any one of claims 4-6, wherein the mobile communication terminal displays the program information data when storing currently parsed and extracted program information data.

8. A front end device for transmitting mobile multimedia broadcast program prompt information, comprising a program prompt information updating module and a multiplexing processing transmitting module connected with each other; wherein,

the program prompt information updating module is arranged for, when program information data in program prompt information needs to be updated, refreshing data update mark information used to identify a data update in the program prompt information while updating the program information data, and outputting the program prompt information to the multiplexing processing transmitting module;

the multiplexing processing transmitting module is arranged for transmitting program prompt information at regular time; when the program prompt information updating module outputs the program prompt information, encapsulating the program prompt information into a data segment of a multiplex subframe of a service multiplex frame and storing the program prompt information, and transmitting the service multiplex frame composed of the multiplexing subframes.

9. The device according to claim 8, wherein the program prompt information updating module is further arranged for presetting an initial value of the data update mark information, the initial value is predetermined by a network front end and a mobile communication terminal; and

the refreshing of the data update mark information is changing the data update mark information into different values.

10. The device according to claim 8, wherein the program prompt information updating module is further arranged for setting a value of a CRC field of the program prompt information as an identifier of the data update mark information; or expanding an update sequence number field in the program prompt information and setting a value of the sequence number field as an identifier of the data update mark information; the identifier of the data update mark information is predetermined by the front end device and a mobile communication terminal.

11. A mobile communication terminal device for receiving mobile multimedia broadcast program prompt information, comprising a receiving module and a parsing processing module connected with each other; wherein,

the receiving module is arranged for receiving a service information multiplex frame at regular time through a broadcast network and outputting the service information multiplex frame to the parsing processing module; and

the parsing processing module is arranged for parsing an input service information multiplex frame, parsing a data segment of a multiplex subframe and extracting data update mark information in program prompt information from the data segment of the

multiplex subframe, judging whether program information data in the program prompt information has been updated according to the data update mark information, and parsing and extracting the program information data and storing it when determining that the program information data has been updated.

12. The device according to claim 11, wherein the parsing processing module is further arranged for storing an initial value of the data update mark information predetermined together with a network front end; determining that the program information data has been updated when currently extracted and received data update mark information is not equal to the initial value; or comparing currently extracted and received data update mark information with formerly stored data update mark information and determining that the program information data has been updated if the two are not equal.

13. The device according to claim 11, wherein the parsing processing module is further arranged for setting a value of a CRC field of the program prompt information as an identifier of the data update mark information; or expanding an update sequence number field in the program prompt information and setting a value of the update sequence number field as an identifier of the data update mark information; the identifier of the data update mark information is predetermined by the mobile communication terminal and a front end device.

14. The device according to any one of claims 11-13, further comprising a displaying module connected to the parsing processing module, wherein,

the parsing processing module is arranged for outputting currently parsed and extracted program information data to the displaying module while storing the currently parsed and extracted program information data; and

the displaying module is arranged for displaying the input program information data.