

Description

Title of Invention: METHOD AND APPARATUS FOR TRANSMITTING VIDEO CONTENT COMPRESSED BY CODEC

Technical Field

- [1] Methods and apparatuses consistent with exemplary embodiments relate to a method and apparatus for transmitting video content compressed by a codec, and more particularly, to a method and apparatus for transmitting video content compressed by using at least one of a plurality of different codecs.

Background Art

- [2] Methods of transmitting video content between devices over a wireless network may include transmitting video content in a non-compressed form and transmitting video content compressed by a codec.
- [3] When video content is transmitted in a non-compressed form, the video content can be transmitted without any degradation in quality. However, since non-compressed transmission takes a long time, non-compressed transmission cannot be used when the video content is to be reproduced in real time or a bandwidth of a communication link between the devices is small.
- [4] As a result, for a small bandwidth communication link or real-time reproduction of video content, the video content is transmitted in a compressed form by compressing the video content using a codec. In this case, however, a receiver that receives the compressed video content needs to be notified about the type of codec used for compressing the video content.

Disclosure of Invention

Solution to Problem

- [5] One or more exemplary embodiments provide a method and apparatus for transmitting video content compressed by at least one of a plurality of different codecs.

Advantageous Effects of Invention

- [6] According to an exemplary embodiment, one codec selection request frame includes an identifier of at least one codec to be used for compression of the video content and one codec selection response frame includes at least one approval information, so that even when the first device transmits a plurality of compressed video contents to the second device, the first device may transmit video contents compressed by a plurality of different codecs by transmitting one codec selection request frame and receiving one codec selection response frame.

Brief Description of Drawings

- [7] The above and other aspects will become more apparent by describing in detail exemplary embodiments with reference to the attached drawings in which:
- [8] FIG. 1 is a flowchart illustrating a method of transmitting video content, according to an exemplary embodiment;
- [9] FIG. 2 is a flowchart illustrating a method of transmitting video content, according to another exemplary embodiment;
- [10] FIG. 3 is a diagram showing a structure of a codec selection request frame according to an exemplary embodiment;
- [11] FIG. 4 is a diagram showing a structure of a codec selection request frame according to another exemplary embodiment;
- [12] FIG. 5 is a diagram showing a structure of a vendor codec identifier field according to an exemplary embodiment;
- [13] FIG. 6 is a diagram showing a structure of a codec selection response frame according to an exemplary embodiment;
- [14] FIG. 7 is a diagram showing a structure of a codec selection response frame according to another exemplary embodiment;
- [15] FIG. 8 is a diagram showing a structure of a codec selection response frame according to another exemplary embodiment;
- [16] FIG. 9 is a diagram showing a structure of a compressed video content frame according to an exemplary embodiment;
- [17] FIG. 10 is a diagram showing a frame type field according to an exemplary embodiment;
- [18] FIG. 11 is a diagram showing a structure of a capability request frame according to an exemplary embodiment;
- [19] FIG. 12 is a diagram showing a compression type field according to an exemplary embodiment;
- [20] FIG. 13 is a diagram showing a structure of a capability response frame according to an exemplary embodiment; and
- [21] FIG. 14 is a block diagram of an apparatus for transmitting video contents, according to an exemplary embodiment.

Best Mode for Carrying out the Invention

- [22] One or more exemplary embodiments provide a method and apparatus for transmitting video content compressed by at least one of a plurality of different codecs.
- [23] According to an aspect of an exemplary embodiment, there is provided a method of transmitting video content compressed by using at least one of a plurality of different codecs to a second device, wherein the transmitting is performed by a first device, the

method including: transmitting a codec selection request frame to the second device, the codec selection request frame including an identifier of the at least one codec to be used to compress the video content and requesting approval of the use of the at least one codec; receiving a codec selection response frame from the second device, the codec selection response frame including at least one approval information indicating whether the use of the at least one codec is approved; and transmitting video content compressed by the at least one codec to the second device based on the codec selection response frame.

- [24] The method may further include transmitting a capability request frame to the second device, which includes an identifier of at least one codec supported by the first device and requests information about a capability of the second device; and receiving a capability response frame including an identifier of at least one codec supported by the second device from the second device in response to the capability request frame, wherein the identifier of the at least one codec included in the codec selection request frame is generated based on the capability response frame.
- [25] The identifier of the at least one codec supported by the first device and the identifier of the at least one codec supported by the second device are included in a combination of an identifier of at least one codec vendor providing the at least one codec and an identifier of at least one codec having a format defined by the at least one codec vendor.
- [26] The capability request frame may further include at least one of codec number information indicating the number of codecs supported by the first device, and codec capability information indicating whether the first device supports a video content compression function.
- [27] The capability response frame may further include at least one of codec number information indicating the number of codecs supported by the second device, and codec capability information indicating whether the second device supports a video content compression function.
- [28] The codec capability information may further include compression type information indicating whether the codec supported by the first device is an H.264 codec or a codec provided by the codec vendor.
- [29] The codec selection request frame may further include at least one of a frame identifier indicating that the codec selection request frame is a frame for requesting selection of a codec to be applied to video content to be transmitted by the first device, content number information indicating the amount of video content to be transmitted by the first device, and an identifier of video content to be transmitted by the first device.
- [30] The codec selection response frame may further include at least one of a frame

identifier indicating that the codec selection response frame is a response frame with respect to the codec selection request frame, content number information indicating the amount of video content to be transmitted to the second device, and an identifier of video content to be transmitted to the second device.

[31] According to an aspect of another exemplary embodiment, there is provided an apparatus for transmitting video content compressed by using at least one of a plurality of different codecs to a second device, the apparatus including: a transmitter that transmits a codec selection request frame to the second device, the codec selection request frame including an identifier of the at least one codec to be used to compress the video content and request approval of the use of the at least one codec; and a receiver that receives a codec selection response frame from the second device, the codec selection response frame including at least one approval information indicating whether the use of the at least one codec is approved, wherein the transmitter transmits video content compressed by the at least one codec to the second device based on the codec selection response frame.

[32] According to an aspect of another exemplary embodiment, there is provided a computer-readable recording medium having embodied thereon a computer program for executing a method of transmitting video content compressed by using at least one of a plurality of different codecs to a second device, the method including transmitting a codec selection request frame to the second device, the codec selection request frame including an identifier that identifies the at least one codec to be used to compress the video content and requests approval of the use of the at least one codec; receiving a codec selection response frame from the second device, the codec selection response frame including at least one approval information indicating whether the use of the at least one codec is approved; and transmitting video content compressed by the at least one codec to the second device based on the codec selection response frame.

Mode for the Invention

[33] Hereinafter, exemplary embodiments will be described in detail with reference to the accompanying drawings.

[34] FIG. 1 is a flowchart illustrating a method of transmitting video content, according to an exemplary embodiment.

[35] In operation 110, a first device transmits a codec selection request frame, which includes an identifier of at least one codec to be used for compressing video content and requests approval to use the at least one codec, to a second device.

[36] The first device includes a device for transmitting the video content, and the second device includes a device for receiving the video content.

[37] A structure of the codec selection request frame according to an exemplary em-

bodiment will be described below with reference to FIGS. 3 and 4.

- [38] In operation 120, the first device receives a codec selection response frame, which includes approval information indicating whether the use of the at least one codec is approved, from the second device.
- [39] If the codec selection request frame transmitted in operation 110 includes a plurality of codec identifiers, the codec selection response frame may also include a plurality of approval information, each of which may indicate approval or rejection for each of the plurality of codec identifiers.
- [40] A structure of the codec selection request frame according to an exemplary embodiment will be described below with reference to FIGS. 6 through 8.
- [41] In operation 130, the first device transmits video content compressed by at least one codec to the second device, based on the codec selection response frame.
- [42] For example, if approval of the use of a codec A and a codec B for transmitting two pieces of video content, namely, first video content and second video content, is requested through the codec selection request frame, and the use of the codec A and the codec B for the two video contents is approved through the codec selection response frame, the first device compresses the first video content by using the codec A and compresses the second video content by using the codec B, and transmits the compressed first and second video contents.
- [43] As such, according to an exemplary embodiment, one codec selection request frame includes an identifier of at least one codec to be used for compression of the video content and one codec selection response frame includes at least one approval information, so that even when the first device transmits a plurality of compressed video contents to the second device, the first device may transmit video contents compressed by a plurality of different codecs by transmitting one codec selection request frame and receiving one codec selection response frame.
- [44] Also, the compressed video content is transmitted in the form of a frame, and a structure of the compressed video content frame according to an exemplary embodiment will be described below with reference to FIG. 9.
- [45] FIG. 2 is a flowchart illustrating a method of transmitting video content, according to another exemplary embodiment.
- [46] In operation 210, the first device transmits a capability request frame, which includes an identifier of at least one codec supported by the first device and requests information about a capability of the second device, to the second device.
- [47] If the first device supports a plurality of codecs, a plurality of codec identifiers may be included in the capability request frame and the plurality of codecs may be provided by different codec vendors.
- [48] A structure of the capability request frame according to an exemplary embodiment

will be described below with reference to FIG. 11.

- [49] In operation 220, the first device receives a capability response frame, which includes an identifier of at least one codec supported by the second device, from the second device in response to the capability request frame.
- [50] A structure of the capability response frame according to an exemplary embodiment will be described below with reference to FIG. 13.
- [51] In operation 230, the first device transmits a codec selection request frame, which includes an identifier of at least one codec to be used for compression of video content and requests approval for the use of the at least one codec, to the second device.
- [52] The identifier of the at least one codec included in the codec selection request frame may be generated based on the capability response frame received in operation 220. For example, the identifier of the at least one codec included in the codec selection request frame may include at least one codec supported by the second device based on the capability response frame.
- [53] In operation 240, the first device receives a codec selection response frame, which includes approval information indicating whether the use of the at least one codec is approved, from the second device.
- [54] In operation 250, the first device transmits content compressed by at least one codec to the second device, based on the codec selection response frame.
- [55] FIG. 3 is a diagram for describing a structure of a codec selection request frame 300 according to an exemplary embodiment.
- [56] Referring to FIG. 3, the codec selection request frame 300 may include a frame identifier field 310, a content number field 320, content identifier fields 330 through 332, and vendor codec identifier fields 340 through 342.
- [57] The frame identifier field 310 indicates that the codec selection request frame 300 is a frame for requesting selection of a codec to be applied to video content to be transmitted by the first device.
- [58] The content number field 320 indicates the amount of video content to be transmitted by the first device.
- [59] The content identifier fields 330 through 332 indicate identifiers of video content to be transmitted by the first device. In FIG. 3, N content identifier fields 330 through 332 corresponding to N video contents are shown.
- [60] The vendor codec identifier fields 340 through 342 indicate identifiers of codecs to be used for compression of video content to be transmitted by the first device. In FIG. 3, N vendor codec identifier fields 340 through 342 corresponding to N codecs are shown. The N codec vendor identifier fields 340 through 342 may include identifiers of N different types of codecs.
- [61] FIG. 4 is a diagram showing a structure of a codec selection request frame 400

according to another exemplary embodiment.

- [62] Referring to FIG. 4, the codec selection request frame 400 may include a frame identifier field 410 and a vendor codec identifier field 420.
- [63] The frame identifier field 410 indicates that the codec selection request frame 400 is a frame for requesting selection of a codec to be applied to video content to be transmitted by the first device.
- [64] The vendor codec identifier field 420 indicates an identifier of a codec to be used for compression of video content to be transmitted by the first device.
- [65] For example, when the codec selection request frame 400 includes the single vendor codec identifier field 420, all video content following transmission of the codec selection request frame 400 are to be compressed by the codec corresponding to the identifier recorded in the vendor codec identifier field 420 and then transmitted.
- [66] The identifier of the codec recorded in the vendor codec identifier field 420 may have a format defined by a codec vendor.
- [67] Hereinafter, a structure of the vendor codec identifier field 420 according to an exemplary embodiment will be described with reference to FIG. 5.
- [68] FIG. 5 is a diagram for describing a structure of a vendor codec identifier field 500 according to an exemplary embodiment.
- [69] Referring to FIG. 5, the vendor codec identifier field 500 according to the exemplary embodiment includes a vendor identifier field 510 and a codec identifier field 520.
- [70] The vendor identifier field 510 indicates an identifier of a codec vendor providing a codec.
- [71] The codec identifier field 520 indicates an identifier of a codec having a format defined by the codec vendor.
- [72] FIG. 6 is a diagram for describing a structure of a codec selection response frame 600 according to an exemplary embodiment.
- [73] Referring to FIG. 6, the codec selection response frame 600 may include a frame identifier field 610, a content number field 620, content identifier fields 630 through 632, and approval information fields 640 through 642.
- [74] The frame identifier field 610 indicates that the codec selection response frame 600 is a response frame with respect to the codec selection request frame 300.
- [75] The content number field 620 indicates the number of video contents to be received by the second device.
- [76] The content identifier fields 630 through 632 indicate identifiers of video contents to be received by the second device.
- [77] The approval information fields 640 through 642 indicate approval information regarding the use of codecs corresponding to the identifiers of the codecs included in the codec selection request frame 300. Some of the approval information fields 640

through 642 may indicate information approving the use of the codecs corresponding to the identifiers of the codecs included in the codec selection request frame 300, and some of the approval information fields 640 through 642 may indicate information rejecting the use of the codecs corresponding to the identifiers of the codecs included in the codec selection request frame 300.

[78] FIG. 7 is a diagram for describing a structure of a codec selection response frame 400 according to another exemplary embodiment.

[79] Referring to FIG. 7, the codec selection response frame 700 may include a frame identifier field 710 and an approval information field 720.

[80] The frame identifier field 710 indicates that the codec selection response frame 700 is a response frame with respect to the codec selection request frame 300.

[81] The approval information field 720 indicates approval information regarding the use of at least one codec corresponding to the identifier of the at least one codec included in the codec selection request frame 300. In other words, the approval information field 720 shown in FIG. 7 may indicate whether the use of all codecs corresponding to identifiers of all the codecs included in the codec selection request frame 300 is approved.

[82] FIG. 8 is a diagram for describing a structure of a codec selection response frame 800 according to another exemplary embodiment.

[83] Referring to FIG. 8, the codec selection response frame includes only a frame identifier field 800.

[84] In FIG. 8, the frame identifier field 800 indicates that the codec selection response frame is a response frame with respect to the codec selection request frame 300. If the first device receives the codec selection response frame including only the frame identifier field 800, the first device may determine that the use of all codecs corresponding to identifiers of all the codecs included in the codec selection request frame 300 corresponding to the codec selection response frame is approved.

[85] FIG. 9 is a diagram for describing a structure of a compressed video content frame 900 according to an exemplary embodiment.

[86] Referring to FIG. 9, the compressed video content frame 900 includes a frame type field 910, a content identifier field 920, a length field 930, and a compression video payload field 940.

[87] The frame type field 910 indicates that a type of the compressed video content frame 900 is a compressed video content type.

[88] Values of the frame type field 910 will be described below with reference to FIG. 10.

[89] The content identifier field 920 indicates a content identifier of the video content included in the video content frame 900.

[90] The length field 930 indicates the length of the video content frame 900.

- [91] The compression video payload field 940 includes the video content compressed by a predetermined codec.
- [92] FIG. 10 is a diagram showing the frame type field 910 according to an exemplary embodiment.
- [93] Referring to FIG. 10, when the frame type field 910 has a value of 0x00, it means that a frame including the frame type field 910 is a non-compressed video data frame; when the frame type field 910 has a value of 0x01, it means that the frame including the frame type field 910 is a video data frame compressed by an H.264 codec; and when the frame type field 910 has a value of 0x02, it means that the frame including the frame type field 910 is a video frame compressed by a codec designated by a codec vendor.
- [94] FIG. 11 is a diagram showing a structure of a capability request frame 1100 according to an exemplary embodiment.
- [95] Referring to FIG. 11, the capability request frame 1100 may include a codec capability field 1110, a vendor codec number field 1120, and vendor codec identifier fields 1130 through 1132.
- [96] The codec capability field 1110 indicates whether the first device supports a video content compression capability. Here, the codec capability field 1110 may further include a compression type field (not shown) indicating a compression type, which will be described below with reference to FIG. 12.
- [97] The vendor codec number field 1120 indicates the number of codecs supported by the first device.
- [98] The vendor codec identifier fields 1130 through 1132 indicate an identifier of at least one codec supported by the first device. In FIG. 11, N vendor codec identifier fields 1130 through 1132 corresponding to N codecs are shown.
- [99] FIG. 12 is a diagram for describing a compression type field 1112 according to an embodiment of the present invention.
- [100] Referring to FIG. 12, the compression type field 1112 indicates that when the compression type field 1112 has a value of 0, it means that video content is compressed by using a first compression technique; and when the compression type field 1112 has a value of 1, it means that a video content is compressed by using a compression technique designated by a vendor. Here, for example, the first compression technique may be an H.264 technique.
- [101] FIG. 13 is a diagram showing a structure of a capability response frame 1300 according to an exemplary embodiment.
- [102] Referring to FIG. 13, the capability response frame 1300 may include a codec capability field 1310, a vendor codec number field 1320, and vendor codec identifier fields 1330 through 1332. The capability response frame 1300 has the same structure

as the capability request frame 1100 shown in FIG. 11.

- [103] The codec capability field 1310 indicates whether the second device supports a video content compression capability.
- [104] The vendor codec number field 1320 indicates the number of codecs supported by the second device.
- [105] The vendor codec identifier fields 1330 through 1332 indicate an identifier of at least one codec supported by the second device. In FIG. 13, N vendor codec identifier fields 1330 through 1332 corresponding to N codecs are shown.
- [106] FIG. 14 is a block diagram of an apparatus 1410 for transmitting video contents, according to an exemplary embodiment.
- [107] Referring to FIG. 14, the apparatus 1410 may include a transmission unit 1412 and a reception unit 1414. In an exemplary embodiment, the apparatus 1410 is mounted on a first device (not shown). However, in another exemplary embodiment, the apparatus 1410 may be the first device. For convenience of explanation, a second device 1420 is further shown in FIG. 14.
- [108] The transmission unit 1412 transmits a codec selection request frame, including an identifier of at least one codec to be used for compression of video content, to the second device 1420.
- [109] The reception unit 1414 receives a codec selection response frame, including at least one approval information indicating whether the use of the at least one codec is approved, from the second device 1420.
- [110] The transmission unit 1412, upon receiving the codec selection response frame, transmits video content compressed by at least one codec to the second device 1420, based on the codec selection response frame.
- [111] As described above, the transmission unit 1412 may further transmit a capability request frame, which includes an identifier of at least one codec supported by the first device and requests information about a capability of the second device 1420, to the second device 1420. The reception unit 1414 may further receive a capability response frame, which includes an identifier of at least one codec supported by the second device 1420 in response to the capability request frame, from the second device 1420.
- [112] The transmission unit 1412 may further transmit first device capability information to the second device 1420, and the reception unit 1414 may further receive the identifier of the at least one codec supported by the second device from the second device 1420.
- [113] The methods according to the exemplary embodiments above can also be embodied as computer-readable codes on a computer-readable recording medium. The computer-readable recording medium is any data storage device that can store data which can be thereafter read by a computer system. Examples of the computer-readable recording medium include read-only memory (ROM), random-access memory (RAM), CD-

ROMs, magnetic tapes, floppy disks, optical data storage devices, etc. The computer-readable recording medium can also be distributed over network-coupled computer systems so that the computer-readable code is stored and executed in a distributed fashion.

- [114] While exemplary embodiments have been particularly shown and described, it will be understood by one of ordinary skill in the art that various changes in form and details may be made therein without departing from the spirit and scope of the present invention as defined by the following claims. The exemplary embodiments should be considered in descriptive sense only and not for purposes of limitation. Therefore, the scope of the inventive concept is defined not by the detailed description but by the appended claims, and all differences within the scope will be construed as being included in the claims.

CLAIMS

What is claimed is:

1. A method of transmitting media content by a first device, the method comprising:

transmitting, from a first device, a codec selection request frame to a second device, the codec selection request frame comprising a first identifier that identifies at least one codec to be used to compress the media content and requesting approval of the use of at least one codec;

receiving, at the first device, a codec selection response frame from the second device, the codec selection response frame comprising approval information indicating whether use of the at least one codec is approved; and

transmitting, from the first device, media content compressed by the at least one codec to the second device based on the codec selection response frame,

transmitting a capability request; and

receiving a capability response frame comprising a second identifier that identifies at least one codec supported by the second device from the second device in response to the capability request frame.

2. The method of claim 1, wherein the second identifier comprises a third identifier of at least one codec vendor providing the codec and a fourth identifier of at least one codec having a format defined by the codec vendor.

3. The method of claim 1, wherein the codec selection request frame further comprises at least one of a frame identifier indicating that the codec selection request frame is a frame for requesting selection of a codec to be applied to media content to be transmitted by the first device, content number information indicating an amount of media content to be transmitted by the first device, and a content identifier indicating media content to be transmitted by the first device.

4. The method of claim 1, wherein the codec selection response frame further comprises at least one of a frame identifier indicating that the codec selection response frame is a response frame with respect to the codec selection request frame, content number information indicating an amount of media content to be

transmitted to the second device, and a content identifier identifying media content to be transmitted to the second device.

5. An apparatus that transmits media content, the apparatus comprising:

a transmitter transmits a codec selection request frame to a second device, the codec selection request frame comprising a first identifier that identifies at least one codec to be used to compress the media content, and requests approval of the use of the at least one codec; and

a receiver receives a codec selection response frame from the second device, the codec selection response frame comprising approval information indicating whether use of the at least one codec is approved,

wherein the transmitter transmits media content compressed by the at least one codec to the second device based on the codec selection response frame,

wherein the transmitter is configured to transmit a capability request;

wherein the receiver is configured to receive a capability response frame comprising a second identifier that identifies at least one codec supported by the second device in response to the capability request frame.

6. The apparatus of claim 5, wherein the second identifier comprises a third identifier of at least one codec vendor providing the codec and a fourth identifier of at least one codec having a format defined by the codec vendor.

7. The apparatus of claim 5, wherein the codec selection request frame further comprises at least one of a frame identifier indicating that the codec selection request frame is a frame for requesting selection of a codec to be applied to media content to be transmitted by the first device, content number information indicating an amount of media content to be transmitted by the first device, and a content identifier indicating media content to be transmitted by the first device.

8. The apparatus of claim 5, wherein the codec selection response frame further comprises at least one of a frame identifier indicating that the codec selection response frame is a response frame with respect to the codec selection request frame, content number information indicating an amount of media content to be transmitted to the second device, and a content identifier identifying media content to be transmitted to the second device.

9. A method of selecting a codec to be used to compress a media content to be transmitted to a second device, by a first device, the method comprising

transmitting a capability request frame requests information about a capability of the second device;

receiving a capability response frame comprising a first identifier that identifies at least one codec supported by the second device from the second device in response to the capability request frame,

transmitting a capability request; and

receiving a capability response frame comprising a second identifier that identifies at least one codec supported by the second device from the second device in response to the capability request frame.

10. The method of claim 9, wherein the capability request frame further comprises at least one of a second identifier that identifies at least one codec supported by the first device, codec number information indicating a number of codecs supported by the first device, and codec capability information indicating whether the first device supports a video content compression function.

11. The method of claim 10, wherein the codec capability information further comprises compression type information indicating whether a codec supported by the first device is an H.264 codec or a codec provided by a codec vendor.

12. The method of claim 9, wherein the capability response frame further comprises codec number information indicating a number of codecs supported by the second device.

13. An apparatus for transmitting media content compressed by using at least one of a plurality of different codecs to a second device, the apparatus comprising,

a transmitter transmits a capability request frame requests information about a capability of the second device;

a receiver receives a capability response frame comprising a first identifier that identifies at least one codec supported by the second device from the second device in response to the capability request frame.

14. The apparatus of claim 13, wherein the capability request frame further comprises at least one of a second identifier that identifies at least one codec supported by the first device, codec number information indicating a number of

codecs supported by the first device, and codec capability information indicating whether the first device supports a video content compression function.

15. The apparatus of claim 14, wherein the codec capability information further comprises compression type information indicating whether a codec supported by the first device is an H.264 codec or a codec provided by a codec vendor.

16. The apparatus of claim 13, wherein the capability response frame further comprises codec number information indicating a number of codecs supported by the second device.