server 1 (e.g., large delay occurs).

[0010]

Accordingly, embodiments of the present invention allows content to be stably supplied to a plurality of terminal devices.

Solution to Problem

[0011]

~~According to a first aspect of the present invention, a transmitting apparatus for supplying content is provided. The transmitting apparatus includes transmitting means for transmitting the content to a receiving apparatus over a network, manifest file receiving means for receiving a manifest file indicating the quality of the content, where the manifest file is sent from the receiving apparatus that has received the content, analyzing means for analyzing the received manifest file, broadcasting means for distributing the content by on-air broadcast on the basis of the result of analysis of the manifest file, and distributing means for distributing the received manifest file.~~In a first aspect, there is provided a transmitting apparatus for supplying content, comprising: transmitting means for transmitting the content to a first receiving apparatus over a network; manifest file receiving means for receiving a manifest file corresponding to the content indicating a quality of the content, the manifest file being received from the first receiving apparatus that has received the content; analyzing means for analyzing the received manifest file; broadcasting means for distributing the content by on-air broadcast, different from the network, on the basis of a result of analysis of the manifest file received by the analyzing means; and distributing means for distributing the received manifest file to a second receiving apparatus over the network when the distributing means receives a request to transmit the received

manifest file from the second receiving apparatus over the network, and for distributing the received manifest file to the second receiving apparatus by said on-air broadcast when the distributing means does not receive the request to transmit the received manifest file from the second receiving apparatus over the network, wherein the second receiving apparatus determines whether to request the content from the transmitting apparatus or directly from the first receiving apparatus based on the quality of the content indicated in the received manifest file.

[0012]

The analyzing means can detect whether quality degradation has occurred in the content on the basis of the received manifest file. If quality degradation is detected in the content, the broadcasting means can distribute the content by on-air broadcast.

[0013]

If the content is distributed by on-air broadcast on the basis of a result of the analysis of the manifest file, the distributing means can add information for receiving the content by on-air broadcast to the received manifest file and distribute the manifest file.

[0014]

According to an embodiment~~the first aspect~~ of the present invention, the transmitting apparatus can further include reception report acquiring means for acquiring a reception report that is sent from the receiving apparatus that has received the content distributed by on-air broadcast and that indicates that the receiving apparatus has received the content and determining whether distribution of the content by on-air broadcast is to be continued on the basis of the number of the acquired reception reports.

[0015]

If it is determined that on-air broadcast distribution of the content is not to be continued, the reception report acquiring means can control the broadcasting means to distribute a broadcast distribution stoppage announcement indicating that the on-air broadcast distribution of the content is stopped.

[0016]

~~According to the first aspect of the present invention, a transmission method for supplying content includes a~~

~~transmitting step of transmitting the content to a receiving apparatus over a network, a manifest file receiving step of receiving a manifest file indicating the quality of the content, where the manifest file is sent from the receiving apparatus that has received the content, an analyzing step of analyzing the received manifest file, a broadcasting step of distributing the content by on-air broadcast on the basis of the result of analysis of the manifest file, and a distributing step of distributing the received manifest file.~~In a second aspect, there is provided a transmission method for supplying content, comprising: transmitting the content to a first receiving apparatus over a network; receiving a manifest file corresponding to the content indicating a quality of the content, the manifest file being received from the first receiving apparatus that has received the content; analyzing the received manifest file; distributing the content by on-air broadcast, different from the network, on the basis of a result of analysis of the received manifest file; distributing, using distribution means, the received manifest file to a second receiving apparatus over the network when the distributing means receives a request to transmit the received manifest file from the second receiving apparatus over the network, and; distributing, using the distribution means, the received manifest file to the second receiving apparatus by said on-air broadcast when the distributing means does not receive the request to transmit the received manifest file from the second receiving apparatus over the network, wherein the second receiving apparatus determines whether to request the content from the transmitting apparatus or directly from the first receiving apparatus based on the quality of the content indicated in the received manifest file.

[0017]

~~According to the first aspect of the present invention, a transmission program for controlling a transmitting apparatus that supplies content includes code for causing a computer of the transmitting apparatus to perform a process including a transmitting step of transmitting the content to a receiving apparatus over a network, a manifest file receiving step of receiving a manifest file indicating the quality of the content, where the manifest file is sent from the receiving apparatus that has received the content, an analyzing step of analyzing the received manifest file, a broadcasting step of distributing the content by on-air broadcast on the basis of the result of analysis of the manifest file, and a distributing step of distributing the received manifest file.~~In a third aspect, there is provided a non-transitory computer-readable storage medium storing computer-readable instructions that, when executed by a computer, cause the computer to execute a transmitting method for supplying content, comprising: transmitting the content to a first receiving apparatus over a network; receiving a manifest file corresponding to the content indicating a quality of the content, the manifest file being received from the first receiving apparatus that has received the content; analyzing the received manifest file; distributing the content by on-air broadcast, different from the network, on the basis of a result of analysis of the received manifest file; and distributing, using distribution means, the received manifest file to a second receiving apparatus over the network when the distributing means receives a request to transmit the received manifest file from the second receiving apparatus over the network, and; distributing, using the distribution means, the received manifest file to the second receiving apparatus by said on-air broadcast when the distributing means does not receive the request to transmit the received manifest file

from the second receiving apparatus over the network, wherein the second receiving apparatus determines whether to request the content from the transmitting apparatus or directly from the first receiving apparatus based on the quality of the content indicated in the received manifest file.

[0018]

According to an embodiment~~the first aspect~~ of the present invention, content is transmitted to a receiving apparatus over a network, and a manifest file that is sent from the receiving apparatus that has received content is received. The manifest file indicates the quality of the content. Content is distributed by on-air broadcast on the basis of the result of analysis of the received manifest file.

[0019]

~~According to a second aspect of the present invention, a receiving apparatus for receiving content includes receiving means for receiving the content transmitted over a network, sending means for generating a manifest file that indicates the quality of the received content and sending the manifest file to the transmitting apparatus, and relaying means for relaying the received content to a different receiving apparatus over the network.~~In a fourth aspect, there is provided a receiving apparatus for receiving content, comprising: receiving means for receiving the content transmitted over a network; sending means for generating a manifest file indicating a quality of the received content and sending the manifest file to the transmitting apparatus; and relaying means for relaying the received content to a different receiving apparatus over the network, wherein the manifest file is distributed to the different receiving apparatus, from the transmitting apparatus, over the network when the transmitting apparatus receives a request to transmit the manifest file from the different receiving apparatus over the network, the manifest file is distributed to the different receiving apparatus, from the transmitting apparatus, by on-air broadcast, different from the network, when the transmitting apparatus does not receive the request to transmit the manifest file from the different receiving apparatus over the network, and the different receiving

apparatus determines whether to request the content from the transmitting apparatus or directly from the receiving apparatus based on the quality of the content indicated in the manifest file.

[0020]

According to an embodiment~~the second aspect~~ of the present invention, the receiving apparatus can further include manifest file acquiring means for acquiring the manifest file that is distributed from the transmitting apparatus and that is generated by a different receiving apparatus. The receiving means can access the different receiving apparatus on the basis of the acquired manifest file and receive the content relayed by the different receiving apparatus.

[0021]

According to an embodiment~~the second aspect~~ of the present invention, the receiving apparatus can further include converting means for converting a coding scheme for the received content. The relaying means can relay the content received and having a converted coding scheme to the different receiving apparatus over the network.

[0022]

The manifest file can include at least one of an amount of delay, the number of lost packets, and an amount of jitter as the information indicating the quality of the content.

[0023]

~~According to the second aspect of the present invention, a receiving method for use in a receiving apparatus for receiving content includes a receiving step of receiving the content transmitted over a network through the receiving method, sending step of generating a manifest file indicating the quality of the received content and sending the manifest file to the transmitting apparatus, and relaying step of relaying the received content to a different receiving apparatus over the network.~~In a fifth aspect, there is provided a receiving method for use in a receiving apparatus for receiving content, comprising: receiving the content transmitted over a network; generating a manifest file corresponding to the content indicating a quality of the received content and sending the manifest file to a transmitting apparatus; and relaying the received content to a different receiving apparatus over the network, wherein the manifest file is distributed to the different receiving apparatus, from the transmitting apparatus, over the network when the transmitting apparatus receives a request to transmit the manifest file from the different receiving apparatus over

the network, the manifest file is distributed to the different receiving apparatus, from the transmitting apparatus, by on-air broadcast, different from the network, when the transmitting apparatus does not receive the request to transmit the manifest file from the different receiving apparatus over the network, and the different receiving apparatus determines whether to request the content from the transmitting apparatus or directly from the receiving apparatus based on the quality of the content indicated in the manifest file.

[0024]

~~According to the second aspect of the present invention, a program for controlling a receiving apparatus for~~

~~receiving content includes code for causing a computer of the receiving apparatus to perform a process including a receiving step of receiving the content transmitted over a network through the receiving method, sending step of generating a manifest file indicating the quality of the received content and sending the manifest file to the transmitting apparatus, and relaying step of relaying the received content to a different receiving apparatus over the network.~~In a sixth aspect, there is provided a non-transitory computer-readable storage medium storing computer-readable instructions that, when executed by a computer, cause the computer to execute a receiving method for receiving content, comprising: receiving the content transmitted over a network, generating a manifest file corresponding to the content indicating a quality of the received content and sending the manifest file to a transmitting apparatus, and relaying step of relaying the received content to a different receiving apparatus over the network, wherein the manifest file is distributed to the different receiving apparatus, from the transmitting apparatus, over the network when the transmitting apparatus receives a request to transmit the manifest file from the different receiving apparatus over the network, the manifest file is distributed to the different receiving apparatus, from the transmitting apparatus, by on-air broadcast, different from the network, when the transmitting apparatus does not receive the request to transmit the manifest file from the different receiving apparatus over the network, and the different receiving apparatus determines whether to request the content from the transmitting apparatus or directly from the receiving apparatus based on the quality of the content indicated in the manifest file.

[0025]

According to an embodiment~~the second aspect~~ of the present invention, content transmitted over a network is received, a manifest file indicating the quality of the received content is generated and is sent to the transmitting apparatus, and the received content is relayed to a different receiving apparatus over the network.

[0026]

~~According to a third aspect of the present invention, a content distribution system includes a transmitting apparatus for transmitting content and a receiving apparatus for receiving the content. The transmitting apparatus includes transmitting means for transmitting the content to the receiving apparatus over a network, manifest file receiving means for receiving a manifest file that indicates the quality of the content and that is sent from the~~

~~receiving apparatus that has received the content, distributing means for distributing the received manifest file, analyzing means for analyzing the received manifest file, and broadcasting means for distributing the content by on-air broadcast on the basis of the result of analysis of the manifest file. The receiving apparatus includes content receiving means for receiving the content transmitted over the network, sending means for generating a manifest file that indicates the quality of the received content and sending the manifest file to the transmitting apparatus, and relaying means for relaying the received content to a different receiving apparatus over the network.~~In a seventh aspect, there is provided a content distribution system comprising: a transmitting apparatus for transmitting content; and a receiving apparatus for receiving the content, wherein the transmitting apparatus includes: transmitting means for transmitting the content to the receiving apparatus over a network, manifest file receiving means for receiving a manifest file corresponding to the content that indicates a quality of the content and that is received from the receiving apparatus that has received the content, distributing means for distributing the received manifest file to a different receiving apparatus over the network when the distributing circuitry receives a request to transmit the received manifest file from the different receiving apparatus over the network, and distributes the received manifest file to the different receiving apparatus by on-air broadcast, different from the network, when the distributing circuitry does not receive the request to transmit the received manifest file from the different receiving apparatus over the network, analyzing means for analyzing the received manifest file, and broadcasting means for distributing the content by said on-air broadcast on the basis of the result of analysis of the manifest file received by the analyzing means, and wherein the

receiving apparatus includes content receiving means for receiving the content transmitted over the network, sending means for generating a manifest file indicating the quality of the received content and sending the manifest file to the transmitting apparatus, and relaying means for relaying the received content to the different receiving apparatus over the network, the different receiving apparatus determines whether to request the content from the transmitting apparatus or directly from the receiving apparatus based on the quality of the content indicated in the manifest file.

[0027]

According to an embodiment~~the third aspect~~ of the present invention, content is transmitted to the receiving apparatus by the transmitting apparatus over a network. A manifest file that indicates the quality of the content and that is sent from the receiving apparatus that has received the content is received, and the content is distributed by on-air broadcast on the basis of the result of analysis of the received manifest file. In addition, the content transmitted over the network is received by the receiving apparatus, a manifest file indicating the quality of the received content is generated and is sent to the transmitting apparatus, and the received content is relayed to a different receiving

apparatus over the network.

Advantageous Effects of Invention

[0028]

According to embodiments~~the first aspect~~ of the present invention, content can be stably transmitted to a plurality of receiving apparatuses.

[0029]

According to embodiments~~the second aspect~~ of the present invention, the content is stably received.

[0030]

According to embodiments~~the third aspect~~ of the present invention, the content is stably distributed to a plurality of receiving apparatuses.

Brief Description of Drawings

[0031]

[Fig. 1] Fig. 1 is a block diagram of an example of a configuration for realizing unicast distribution of content.

[Fig. 2] Fig. 2 is a block diagram of an example of a configuration for realizing IP multicast distribution of content.

[Fig. 3] Fig. 3 is a block diagram of an example of a configuration for realizing overlay multicast distribution of content.

[Fig. 4] Fig. 4 is a block diagram of an example of the configuration of a content distribution system according to