MEASURING RESPONSE TRENDS IN A DIGITAL TELEVISION NETWORK

PRIORITY CLAIM AND RELATED PATENT APPLICATION

[0001] This document claims the benefit of priority from United States Patent Application Serial Number 13/952,471, entitled "Measuring Response Trends in a Digital Television Network," filed July 26, 2013. The entire disclosure of the above-referenced application is incorporated by reference as part of the specification of this PCT application.

[0002] This document relates to digital content networks, including monitoring a content network based on message trends.

BACKGROUND

[0003] With the advent of connectivity technologies such as the World Wide Web, multimedia content is ubiquitously present and accessible from practically any location where a user can be. To meet the increasing user demands, content service providers have deployed networks that have steadily increased in size and complexity. Being able to provide content that a user wants at the time and location the user wants it, and be able to bill the user correctly can provide competitive advantage to content service providers.

[0004] Better techniques for monitoring operation of a content network for any irregularities are desirable.

SUMMARY

[0005] Techniques and systems for providing a trend server outside a content provider network to communicate with the content provider network to build a trend record based on responses received from the content provider network for monitoring certain activity trend or tendency in the content provider network and provide an alert when the content provider network behaves abnormally.

[0005a] According to a first aspect of the present invention, there is provided a computer-implemented method to monitor status of a content provider network, comprising: sending, from a trending server, a first request message to the content provider network, wherein the first request message has a request format associated with an associated type value; receiving, at the trending server, a first response message responsive to the first request message having the request format from the content provider network, the first response message comprising content data having a parameter value encoded in the first response message, the parameter value defining a characteristic of the content data itself; determining, by the trending server, whether or not the first response message is normal by comparing the parameter value of the first response message data with a trend record for the type value associated with the first request message, the trend record defining a normal range of values for the parameter value within communications sent from the content provider network to a

plurality of client devices; selectively updating the trend record based on the first response message; and generating an alert when it is determined that the first response message is abnormal.

[0005b] According to a second aspect of the present invention, there is provided an apparatus for monitoring operation of a content provider's network, comprising: a hardware processor; a status request transmission module of the hardware processor configured to transmit a plurality of status requests to the content provider's network, each status request having a request format associated with an associated request type; a status response reception module of the hardware processor configured to receive status responses responsive to the status requests having the request formats from the content provider's network, each status response comprising content data having a parameter value encoded in the first response message, the parameter value defining a characteristic of the content data itself; a response sorting module of the hardware processor configured to assign, for every received status response, a corresponding request type based on a status request for which the status response was received; a trending record-keeping module of the hardware processor configured to maintain trend records based on the parameter values of a predetermined number of prior status responses received for each request type; a trending estimation module of the hardware processor configured to estimate-a trend for each request type, based on the parameter value of each status response and a user setting for that request type, the trend defining a normal range of values for the parameter value within communications sent from the content provider network to a plurality of client devices; a trend checker module of the hardware processor configured to check, for each received status response, whether or not the received status response is within the trend for the corresponding request type by comparing the parameter value of the received status response with the normal range of values; and a trend alert module of the hardware processor configured to issue-an alert when the received status response is not within the trend for the corresponding request type.

[0005c] According to a third aspect of the present invention, there is provided a computer program product comprising a non-transitory computer-readable storage medium having code stored thereupon, the code, when executed by a processor, causing the processor to implement a method of monitoring operation of a content provider's network, the method comprising: receiving a first message from the content provider's network, the first response message being responsive to a request message having a request format and comprising content data having a parameter value encoded in the first response message, the parameter value defining a characteristic of the content data itself; determining whether the first message is normal by comparing the parameter value of the first response message data with a trend of previously received messages having a same message type as the first message, the trend record defining a normal range of values for the parameter value within

communications sent from the content provider network to a plurality of client devices; selectively updating, based on the first message, the trend for the message type of the first message; and generating an alert when the first message is determined to be not normal.

[0005d] According to a fourth aspect of the present invention, there is provided a system for monitoring operation of a web service provider, the system comprising: one or more web servers under management of the web service provider, the one or more web servers located inside the web service provider's network; a plurality of monitoring servers positioned external to the web service provider's network and geographically separated from each other; wherein each monitoring server is configured to: transmit sync messages to the one or more web servers; maintain a record of expected responses to the sync messages; receive a status response message from the one or more web servers, the status response message being responsive to a request message having a request format and comprising content data having a parameter value encoded in the first response message, the parameter value defining a characteristic of the content data itself; determine whether the status response message is an expected response by comparing the parameter value of the status response message data with the record of expected responses, the record of expected responses defining a normal range of values for the parameter value within communications sent from the web service provider network to a plurality of client devices; and issue an alert when the status response message is not an expected response.

[0006] In one embodiment, a method of monitoring status of a content provider network is provided. The method may be implemented by a trending server and includes sending a first request message to the content provider network, where the first request message has an associated type value, receiving a first response message from the content provider network, determining whether or not the first response message is normal by comparing with a trend record for the type value associated with the first request message, selectively updating the trend record based on the first response message and generating an alert when it is determined that the first response message is abnormal.

[0007] In another embodiment, an apparatus for monitoring operation of a content provider's network is disclosed. The apparatus includes a status response reception module that receives status responses from the content provider's network, a response sorting module that assigns, for every received status response, a corresponding request type based on a status request for which the status response was received, a trending record-keeping module that maintains trend records based on a predetermined number of prior status responses received for each request type, a trending estimation module that estimates a trend for each request type based on the status response and a user setting for that request type, a trend checker module that checks, for each received status response, whether or not the received status response is within the trend for the corresponding request type, and a trend alert module that issues an

alert when the received status response is not within the trend for the corresponding request type.

[0008] In yet another embodiment, a computer program product comprising a computer-readable storage medium having code stored thereupon is disclosed. The code, when executed by a processor, causes the processor to implement a method of monitoring operation of a content provider's network. The method includes receiving a first message from the content provider's network, determining whether the first message is normal by comparing with a trend of previously received messages having a same message type as the first message, selectively updating, based on the first message, the trend for the message type of the first message, and generating an alert when the first message is determined to be not normal.

[0009] In a further embodiment, a system for monitoring operation of a web service provider is disclosed. The system includes one or more web servers under management of the web service provider, the one or more web servers located inside the web service provider's network and a plurality of monitoring servers positioned external to the web service provider's network and geographically separated from each other. Each monitoring server is configured to transmit sync messages to the one or more web servers, maintain a record of expected responses to the sync messages, receive a status response messages from the one or more web servers, and issue an alert, when the status response message is not an expected response.

CLAIMS

1. A computer-implemented method to monitor status of a content provider network, comprising:

sending, from a trending server, a first request message to the content provider network, wherein the first request message has a request format associated with an associated type value;

receiving, at the trending server, a first response message responsive to the first request message having the request format from the content provider network, the first response message comprising content data having a parameter value encoded in the first response message, the parameter value defining a characteristic of the content data itself;

determining, by the trending server, whether or not the first response message is normal by comparing the parameter value of the first response message data with a trend record for the type value associated with the first request message, the trend record defining a normal range of values for the parameter value within communications sent from the content provider network to a plurality of client devices;

selectively updating the trend record based on the first response message; and

generating an alert when it is determined that the first response message is abnormal.

2. The method of claim 1, further comprising:

receiving, at the trending server, a second request message from a user device; and

generating the first request message based on the second request message.

3. The method of claim 2, wherein the trend record is based on a request type of the second request message.

4. The method of claim 1, wherein the trend record accumulates a predetermined number of previously received response messages having the type value.

5. The method of claim 1, further comprising:

providing a second response message, based on the first response message, to a user device originating the first request message.

6. The method of claim 6, wherein the second response message comprises the first response message and the second response message is provided irrespective of whether the first response message is determined to be normal or not.

7. The method of claim 6, wherein the second response message comprises the first response message and further includes an alert message when the first response message is determined to be not normal.

8. The method of claim 1, wherein the trending server is located external to the content provider network.

9. The method of claim 2, further comprising:

configuring the trending server to be a part of a plurality of geographically separated servers configured to perform trending and monitoring operations and wherein at least one of the plurality of geographically separated server performs trending and monitoring without receiving the first request message from the user device.

10. An apparatus for monitoring operation of a content provider's network, comprising:

a hardware processor;

a status request transmission module of the hardware processor configured to transmit a plurality of status requests to the content provider's network, each status request having a request format associated with an associated request type;

a status response reception module of the hardware processor configured to receive status responses responsive to the status requests having the request formats from the content provider's network, each status response comprising content data having a parameter value encoded in the first response message, the parameter value defining a characteristic of the content data itself;

a response sorting module of the hardware processor configured to assign, for every received status response, a corresponding request type based on a status request for which the status response was received;

a trending record-keeping module of the hardware processor configured to maintain trend records based on the parameter values of a predetermined number of prior status responses received for each request type;

a trending estimation module of the hardware processor configured to estimate a trend for each request type, based on the parameter value of each status response and a user setting for that request type, the trend defining a normal range of values for the parameter value within communications sent from the content provider network to a plurality of client devices;

a trend checker module of the hardware processor configured to check, for each received status response, whether or not the received status response is within the trend for the corresponding request type by comparing the parameter value of the received status response with the normal range of values; and

a trend alert module of the hardware processor configured to issue an alert when the received status response is not within the trend for the corresponding request type.

11. The apparatus of claim 11, further including:

a trend user interface module of the hardware processor configured to receive an input for the user setting, wherein the input provides an input request type and an associated trend to use for the input request type.

12. The apparatus of claim 11, wherein:

the status request transmission module transmits the plurality of status request messages using a stateless protocol.

13. The apparatus of claim 11, wherein a first status request comprises a request to purchase a multimedia program and a corresponding first status response comprises a value representing cost of purchase of the multimedia program.

14. The apparatus of claim 11, wherein a first status request comprises a request to receive a web page and a corresponding first status response comprises contents of the web page.

15. A computer program product comprising a non-transitory computer-readable storage medium having code stored thereupon, the code, when executed by a processor, causing

the processor to implement a method of monitoring operation of a content provider's network, the method comprising:

receiving a first message from the content provider's network, the first response message being responsive to a request message having a request format and comprising content data having a parameter value encoded in the first response message, the parameter value defining a characteristic of the content data itself;

determining whether the first message is normal by comparing the parameter value of the first response message data with a trend of previously received messages having a same message type as the first message, the trend record defining a normal range of values for the parameter value within communications sent from the content provider network to a plurality of client devices;

selectively updating, based on the first message, the trend for the message type of the first message; and

generating an alert when the first message is determined to be not normal.

16. The computer program product of claim 16, wherein the method further comprises:

transmitting a status request message to the content provider's network and wherein the first message is received in response to the status request message.

17. The computer program product of claim 17, wherein the method further comprises:

receiving a second message from the user device; and

transmitting the status request message based on the second message.

18. A system for monitoring operation of a web service provider, the system comprising:

one or more web servers under management of the web service provider, the one or more web servers located inside the web service provider's network;

a plurality of monitoring servers positioned external to the web service provider's network and geographically separated from each other; wherein each monitoring server is configured to:

transmit sync messages to the one or more web servers;

maintain a record of expected responses to the sync messages;

receive a status response message from the one or more web servers, the status response message being responsive to a request message having a request format and comprising content data having a parameter value encoded in the first response message, the parameter value defining a characteristic of the content data itself;

determine whether the status response message is an expected response by comparing the parameter value of the status response message data with the record of expected responses, the record of expected responses defining a normal range of values for the parameter value within communications sent from the web service provider network to a plurality of client devices; and

issue an alert when the status response message is not an expected response.

19. The system of claim 19, wherein each monitoring server is further configured to:

update the record when a new status response message is received.

20. The method of claim 1, wherein:

the client devices are located within a common geographic area; and

the normal range of values is specific to the common geographic area.

21. The apparatus of claim 11, wherein:

the client devices are located within a common geographic area; and

the normal range of values is specific to the common geographic area.

22. The computer program product of claim 16, wherein:

the client devices are located within a common geographic area; and

the normal range of values is specific to the common geographic area.

23. The system of claim 19, wherein:

the client devices are located within a common geographic area; and

the normal range of values is specific to the common geographic area.