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(54) Title: ERROR BASED ADVERTISEMENT DELIVERY

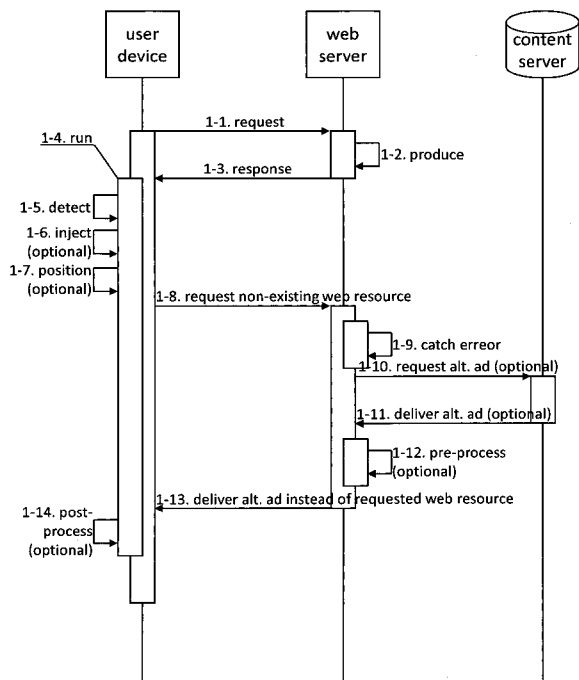


Fig. 1

(57) Abstract: The invention relates to methods for error based advertisement delivery in a communication system comprising a user device and a web server. The invention also provides the communication system for performing these methods, and computer readable media the instructions of which cause the communication system to perform the methods described herein. The user device runs executable code that is provided by the web server including: detecting whether ad-blocking software is run for blocking the display of an advertisement, and requesting from the web server a non-existing web resource, depending on whether the user device runs the ad-blocking software. The web server responds to the request for the non-existing web resource including: catching the error invoked by the request from the user device, and delivering to the user device an alternative advertisement associated with the requested non-existing web resource for display by the user device.

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Error based Advertisement Delivery

Field of the Invention

The invention generally relates to the delivery of web based online advertisement, and particularly to methods, systems and computer readable storage media for error based advertisement delivery preventing the display of the advertisement from being blocked by ad-blocking software.

Background of the Invention

Providers of digital content often embed advertisements in the content they provide to users. Some users employ Ad-Blocking Software (ABS) that prevents viewing of advertisements. Examples of ABS include, for example, browser plug-ins such as Ad-Block, Ad-Block Plus and EasyBlock. Some browsers or readers, such as Safari Reader and Clearly, include advertisement stripping functionality. The use of ABS causes considerable financial and other damage to Content Providers (CPs).

PCT Patent Application Publication 2013/0132423, whose disclosure is incorporated herein by reference, describes methods for detection and mitigation of online advertisement abuse. Specifically, for detection and mitigation of online advertisement abuse, it is disclosed that executable code is provided to a user device that runs on the user device, verifies whether the user device runs abuse software for abusing display of an advertisement, and chooses whether to display the advertisement or an alternative advertisement depending on whether the user device runs the abuse software.

In the described method, the alternative advertisement is delivered to the user device in a format, which makes it indistinguishable from content. After delivery, the executable code allows converting the alternative advertisement from the content indistinguishable format, in which it is delivered to the user device, into a second format, which allows displaying on the user device. Accordingly, the executable code includes a predetermined association between the alternative advertisement and the format conversion to be applied, thereby disclosing information, which could be used for future Ad-blocking software to also block the retrieval of the alternative advertisement.

U.S. Patent Application Publication 2008/0319862, whose disclosure is incorporated herein by reference, describes methods for preventing ad stripping from ad-supported digital content. The methods include removing part of the content, and using a digital rights management (DRM) proxy server to provide links to any removed content part, and to ads to be inserted in the content to a player which plays the content with the ads.

The DRM proxy server ensures that the player cannot distinguish between removed content parts and the ads. A system enabling the method includes in addition to the DRM server and player, an encoder used to remove at least one part from the content, encode the remaining content and the removed part and supply links to each removed part to the DRM proxy server. The system further includes an ad server used to provide links to ads to the DRM proxy server.

In this respect the invention aims at overcoming the disadvantages noted with respect to the prior art.

Specifically, it has been recognized that in addition to the delivery of online advertisement the ability of tracking at the web server which of the delivered online advertisement is displayed by the user device is advantageous for the attribution of advertising revenues. Moreover, with the presently available online advertisement delivery mechanisms it is not possible for the web server to know whether the original advertisement or the alternative advertisement is displayed by the user device.

In particular, depending on whether the user device runs abuse software for abusing display of an advertisement, either the original or the alternative advertisement is displayed to the user, hence, making it impossible for content provider's web server to track visibility statistics for either one of the delivered online advertisements.

10 Summary of the Invention

One object of the invention is to provide an improved mechanism for the delivery of advertisement to a user device, namely which prevents the displaying of the advertisement from being blocked by ad-blocking software running on the user device. Another object of the invention is to provide an advertisement delivery mechanism, which facilitates tracking by the web server of advertisements that are displayed on the user device.

The objects are solved by the subject matter of the independent claims. Advantageous embodiments are subject to the dependent claims.

According to a first aspect, the invention dispenses with the need for incorporating a reference to an alternative advertisement into information which is provided by a content provider's web server to a user device. Instead, information is supplied to the user device enabling same user device to request a non-existing web resource. The non-existing web resource is set independently from the alternative advertisement, and the request thereof results in an error at the server.

Particularly, the non-existing web resource can be a reference to any web resource as long as it is not existent on the server, such that a request thereof by the user device results due to its non-existence in an error at the server. The term web resource shall be used in the following as reference for objects, which can be retrieved by the user device from the server. For example, a web resource is any object, which can be referenced by a Uniform Resource Locator, URL, including an embedded image in animated or non-animated form, an embedded video, and a digital document including a reference to an image in animated or non-animated form or to an embedded video.

Accordingly, due to the error based delivery, only the web server and not the user device "knows" about the alternative advertisement. The information supplied by the web server to the user device does not incorporate information on the alternative advertisement. In other words, the information provided to the user device is free of direct or indirect references to the alternative advertisement, such that the provided information is not deficient or objectionable by the ad-blocking software.

Ad-blocking software shall be understood as software which, when run on a user device, is blocking the display of advertisements. This blocking is exemplarily achieved by the ad-blocking software:

- preventing the retrieval of an advertisement,
- removing a reference to an advertisement prior to its retrieval, or

- masking the display of an advertisement after its retrieval.

In any case, the ad-blocking software applies one of these measures on the basis of an attribute of the non-existing web resource, a tag of the non-existing web resource; and a position in the structure of the digital document.

- 5 A non-existing web resource can be set such that it is not susceptible to the blocking by the ad-blocking software. In other words, an attribute of the non-existing web resource, including: a path on the web server, an id, a name, a size, a class, a style attributed in the digital document, a tag of the non-existing web resource; and a position in the structure of the digital document are variably definable, thereby preventing a blocking through the ad-blocking software.
- 10 Further, even the fact that the non-existing web resource request must always be directed to the content provider's server does not result in a weakness that can be exploited by the ad-blocking software. Instead, the content provider's server is the source for any content to be displayed such that the communication therewith cannot be prevented. Accordingly, the non-existing web resource is indistinguishable from content delivered by the web server, and hence avoids its retrieval being
- 15 inhibited or the reference from being removed by ad-blocking software. In other words, the ad-blocking software cannot distinguish between content delivered in form of existing web resources and the non-existing web resources.

In summary, the non-existing web resource is set independently of the alternative advertisement to be displayed by the user device in case ad-blocking software is run thereon. The non-existing web resource accordingly dispenses with the need for incorporating (or revealing) information on an alternative advertisement, in the document provided by the content provider's web server to a user device. Consequently, at least for this reason the approach is advantageous over the prior art.

According to a second aspect, the invention allows tracking of the displaying of online advertisement at the content provider's web server, in particular of the alternative advertisement. The error based advertisement delivery provides that the non-existing web resource is only requested from the web server when it is detected that advertisements are blocked by way of ad-blocking software.

On the one hand, if the non-existing web resource is not requested from the web server, the user device does not run ad-blocking software for blocking the display of an advertisement. Accordingly, the content provider's web server may assume that an initially provided digital document, such as for example a web page, is displayed in its pre-specified format, i.e. without interference by the ad-blocking software. Hence, advertisements included in the initially provided advertisements are displayed by the user device and the display thereof can be tracked by the content provider's web server.

On the other hand, if the non-existing web resource is requested from the web server, the user device runs ad-blocking software and, hence, advertisements included in an initially provided digital document, such as for example the web page, are blocked from being displayed by the user device. Accordingly, due to the non-existing web resource request, the content provider's web server can track that the initially included advertisements are not displayed.

Further, due to the fact that the non-existing web resource is indistinguishable, and hence, not blocked by the ad-blocking software run on the user device, a subsequently delivered alternative advertisement is to be displayed by the user device and thereby enables the tracking of the alternative advertisement

at the content provider's web server. Consequently, at least for this reason the approach is also advantageous over the prior art.

5 According to an embodiment in line with the first and the second aspect, the invention provides methods for error based advertisement delivery in a communication system comprising a user device and a web server. The invention also proposes the communication system for performing these methods, and computer readable media the instructions of which cause the communication system to perform the methods described herein.

10 The user device runs executable code that is provided by the web server including: detecting whether or not ad-blocking software is run for blocking the display of an advertisement, and requesting from the web server a non-existing web resource resulting in an error at the web server, depending on whether or not the user device runs the ad-blocking software.

15 The web server responds to the request for the non-existing web resource including: catching the error invoked by the request from the user device, and delivering to the user device, instead of the non-existing web resource, an alternative advertisement associated with the non-existing web resource for display by the user device.

Brief description of the Figures

20 For a better understanding of the invention, same will be explained in the following based on the embodiments shown in the figures. Corresponding parts are given corresponding reference numerals and terms. Furthermore, those features or combinations of features which show or describe different embodiments may form separate inventive solutions in themselves. The invention will now be described by way of example with reference to the drawings, wherein:

Fig. 1 shows a sequence diagram of the error based advertisement delivery mechanism according to one detailed embodiment of the invention,

25 **Fig. 2** illustrates an activity diagram of the error based advertisement delivery mechanism according to another detailed embodiment of the invention, and

Fig. 3 shows an activity diagram of the error based advertisement delivery mechanism according to a more specific implementation of the other detailed embodiment of the invention.

Detailed Description of the Invention

30 In the following, several embodiments of the invention will be explained in detail. For exemplary purposes only, sequences of steps and states are disclosed with reference to a specific implementation on a system including at least a user device and a web server. Nevertheless, the terminology shall not be construed as being limiting on the claims which must be understood as allowing for the deployment in any kind of front-end, and back-end based content delivery system which includes the delivery and display of advertisements to the user.

35 In the context of the invention, the term 'advertisement' or the term 'alternative advertisement' shall be understood as referencing a web resource, preferably, one of: an embedded image in animated or non-animated form, an embedded video, and a digital document including a reference to an image in

animated or non-animated form or to an embedded video. In other words, the advertisement and the alternative advertisement are both a reference to a web resource which has advertising character.

Specifically, the following examples of a non-existing web resource are given with reference to Hyper Text Markup Language, HTML, code samples, which shall however not be construed as limiting the approach to HTML type web servers only. Moreover, any different format may be used for communication between the user device and the web server which provides the functionality of the below described embodiments.

Prior to discussing the sequence diagram illustrated in Fig. 1, the general concept of the error based advertisement delivery shall be laid out in connection with Figs. 2 and 3. Therein, activities are shown that are performed by a user device or by a web server comprised in a communication system resulting in one detailed embodiment of the invention.

The processing flow derivable from the activity diagrams in the Figs. 2 and 3 shall, however, shall not be construed as limiting the underlying invention. Moreover, the Figs. are merely intended to give an overview over one of multiple modes of carrying out the error based advertisement delivery.

Firstly, the web server produces (step 2-1, or 3-1) a digital document incl. a content, an advertisement (or in short: ad), and a non-existing web resource. The production of the digital document may result from many causes, for example, the request of this digital document by the user device. Thereafter, the web server embeds (step 2-2, or 3-3) executable code into the digital document which subsequently, the web server delivers (step 2-3, or 3-4) to the user device.

Upon receipt of the digital document, the user device runs (step 2-4, or 3-5) the executable code which enables the user device to detect (step 2-5, or 3-6) whether the advertisement (or in short: ad) included in the delivered document has been blocked from being displayed on the user device, or put differently, whether the user device runs ad-blocking software.

If the detection reveals that the displaying of advertisement is not blocked (i.e. "no"), the user device terminates (step 2-6, or 3-7) running the executable code, the activity diagram ends. If the detection reveals that the displaying of the advertisement is blocked (i.e. "yes"), the user device proceeds to request (step 2-7, or 3-8) a non-existing web resource from the web server. Notably, the non-existing web resource must be of various origin (e.g. included in the digital document or code injected therein) and may be requested as triggered by the positive detection (i.e. as cause-and-effect relationship) or as part of the subsequent processing of the digital document.

The request for the non-existing web resource results in an error at the web server. In this respect, the web server catches (step 2-8, or 3-9) the error invoked by the request for the non-existing web resource and carries out error processing. As part of the error processing, the web server delivers (step 2-9, or 3-10) an alternative advertisement to the user device instead of the requested non-existing web resource. Thereafter, the user device resumes (step 2-10, or 3-11) running the executable code for displaying of the alternative advertisement.

Important to note, the error processing at the web server is transparent to the user device. The alternative advertisement – delivered instead of the requested non-existing web resource – is different from the non-existing web resource; however, it is received by the user device as if it was the requested non-existing web resource. In other words, the user device does not notice that requested non-existing

web resource does indeed not exist on the web server, but instead processes the response as if it was an existing web resource.

Advantageously, as the non-existing web resource is set independently of the delivered alternative advertisement, same alternative advertisement is not revealed by the non-existing web resource, more specifically also not by the digital document. In other words, an ad-blocking software run on the user device does not object to the processing of the digital document and, more importantly, to the displaying of the alternative advertisement, as the user device thinks it is displaying the requested non-existing web resource. Further, the approach advantageously facilitates tracking of the displayed advertisement at the web server.

5 Specifically, in connection with Fig. 3, the steps of establishing an association between non-existing web resources and alternative advertisements to be delivered shall be exemplified. The association may correspond to a cache entry establishing the link there between. At the time of production of the digital document, the web server associates (step 3-2) a non-existing web resource with an alternative advertisement to be delivered in response to a request thereto. Later, when the request for the delivery is received by the web server, as part of the error processing it reverts back to the association and delivers (step 3-10) the associated alternative advertisement instead of non-existing web resource.

Accordingly, this association advantageously enables a purposeful and target-oriented delivery of advertisement by the web server to the user device while still realizing the effect of delivering the alternative advertisement without it being revealed to the user device.

20 Referring now to Fig. 1, an exemplary embodiment of the communication system performing the error based advertisement delivery is shown. The system includes a user device and a web server. Further, in this specific exemplary embodiment, the system additionally includes a separately deployed content server. Particularly, the server sided functionality may, however, must not be deployed in a distributed fashion between the web server itself and a content server.

25 For an error based advertisement delivery, the user device requests (step 1-1) in form of a communication message from the web server, a digital document to be displayed to a user. Exemplary, the digital document may be a web page, e.g. an HTML web page, to be delivered by the web server. Nevertheless, the digital document can have any form which allows delivering embedded code to a user device.

30 According to an exemplary implementation, the digital document includes content and an advertisement both to be displayed by the user device. The content as well as the advertisement may be one of a text, an embedded image, or an embedded video. Accordingly, the content may, for instance, be the text of requested web page, and the advertisement, may be an animated Graphics Interchange Format, GIF, image showing sequence of images corresponding to a television commercial.

35 The digital document in the exemplary implementation further includes, in embedded form, the executable code which is provided by the web server to the user device. For example, the executable code can be JavaScript language type source code which may be included in-line in an HTML web page as digital document. However, different types of executable code are conceivable as long it is ensured that the executable code at least enables the user device to detect whether or not ad-blocking software is run on the user device.

40

For example, it is also possible that the executable code is provided separately from the digital document to which it relates. In this respect, the user device establishes two separate connections to the web server, one connection for providing the digital document including an advertisement and content, and another connection for providing the executable code by the web server.

- 5 In this respect, scenarios become possible where the user device does not (always) download the executable code at the same time with a requested digital document. Instead, the user device may access a cached version of the executable code provided by the web server at an earlier point in time, hence, may advantageously reduce the data amount and loading time of new requests for the digital document.
- 10 Notably, the detection functionality of whether or not the user device is running ad-blocking software is most efficiently performed on the user device. In many situations, the web server alone cannot determine whether (or not) an advertisement is blocked from being displayed by the user device. For example, when ad-blocking software prevents (e.g. masks) the display of advertisement after its retrieval by the user device, the web server cannot identify this type of advertisement blocking.
- 15 Consequently, the user device sided detection of ad-blocking software allows for most accurate detection results.

In response to the request by the user device, the web server produces (step 1-2) the digital document to be delivered to the user device. The digital document includes executable code that can be run on the user device. Running the executable code on the user device enables server-sided control of the user device to perform the corresponding steps of the error based advertisement delivery method.

20

Advantageously, at the time of production of the digital document the web server already pre-determines the subsequently performed error based advertisement delivery mechanism steps between the user device and the web server.

For this purpose, the web server already establishes, in an exemplary implementation, an association between a non-existing web resource and the alternative advertisement prior to the web server providing the executable code to the user device. This association is maintained at the web server for a predetermined amount of time which may be set to a time after which the web server no longer expects requests from the user device for the non-existing web resource.

25

Exemplarily, prior to delivering the executable code to the user device, the web server associates the non-existing web resource with a existing web resource, which is to be delivered by the web server as associated alternative advertisement instead of the non-existing web resource. In this respect, the web server builds upfront knowledge which web resource as alternative advertisement is to be delivered to a user device instead of the non-existing web resource when the request to this non-existing web resource is received.

30

In a more specific exemplary implementation, the association determined by the web server between the non-existing web resource and an existing web resource to be delivered as alternative advertisement, includes randomizing at least one of: an attribute of the non-existing web resource, including: a path on the web server, an id, a name, a size, a class, and a style attributed in the digital document; a tag of the non-existing web resource; and a position in the structure of the digital document.

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Randomizing of at least one of the attributes, the tag or the position may, for example, be achieved by the web server based on a random number generator. In this respect, the web server uses random numbers generated by the random number generator, or uses entries in a pre-stored codebook or dictionary that are referenced by the random numbers in order to create therefrom at least one of the attributes of the non-existing web resource, the tag of the non-existing web resource or the position in the structure of the digital document and to build thereon the association between the non-existing web resource and an existing web resource to be delivered as alternative advertisement.

In this respect, the attributes, tag, or position of the reference to the non-existing web resources may vary or change even between different requests for delivering a same digital document including the reference to the non-existing web resources thereby making it indistinguishable over content simultaneously delivered by the web server to the user device and preventing from its detection by ad-blocking software.

Subsequent to its production, the digital document is delivered (step 1-3) in form of a communication message by the web server to the user device as a response to the corresponding request discussed above. This delivery of the digital document is facilitated by the web server in response to the request by the user device, namely via an already established connection between the user device and the web server.

Upon receipt of the response including the digital document, the user device runs (step 1-4) the executable code embedded in the digital document. In other words, the user device runs the provided embedded executable code, with respect to which the following description only discusses functionality relevant to the error based advertisement delivery. Nevertheless, it may be well appreciated that the executable code can also include different functionality which, for example, facilitates the display of the digital document or provides special display effects in connection with the digital document.

The executable code, when run on the user device, detects (step 1-5) whether or not ad-blocking software is run on the user device. For example, the detection may rely on a pre-determined advertisement referenced in the digital document. Most accurate detection results can be achieved if, for example, the attributes, tag or position of the advertisement are selected such that ad-blocking software must consider the reference as corresponding to an advertisement. However, the presence of advertisements in common advertising positions (e.g. the top row, or the hockey-stick arrangement) may also allow for good detection results.

The embedding of executable code in a digital document has become common practice for delivered digital documents, such that ad-blocking software cannot be configured to globally prevent the user device from running executable code. Further, ad-blocking software has not yet advanced to a stage that it can detect and disable functionality in the provided executable code which is capable of detecting whether or not ad-blocking software is run on the user device. Hence, it may be well assumed that the executable code provided by the web server to the user device allows for accurate detection results of whether or not ad-blocking software is run on the user device.

Advantageously, the web server may in this respect not only track the display of the alternative advertisement associated with the requested non-existing web resource but also track the display of the initially provided advertisements as result of the condition where no request for a non-existing web resource is issued. In other words, in case the request for the non-existing web resource is not received

by the web server, the web server knows that the initially provided advertisement is displayed on the user device. Thereby the executable code allows accurate feedback on the detection result(s).

Further, the executable code not only provides for the ad-blocking software detecting functionality but also provides for the error based advertisement delivery functionality, including requesting a non-existing web resource from the web server. In other words, in case the executable code detects that the user device does not run ad-blocking software, the error based delivery functionality is disabled. In case the executable code on the other hand detects that ad-blocking software is run on the user device, the error based delivery functionality is enabled, including initiating the request for the non-existing web resource.

10 In an example, the digital document includes a reference to the non-existing web resource in an initially disabled state. Accordingly, in case of detection of no running ad-blocking software, the executable code may simply terminate and does not need to take any actions which prevent from issuing the request of the non-existing web resource to the web server. At the same time, in case of detection of running ad-blocking software, the executable code must enable the reference to the non-existing web resource
15 from the initially disabled state such that the request thereof is actively issued by the user device to the web server. Exemplarily, the reference to the non-existing web resource is hidden resulting in the initially disabled state.

In an alternative example, the digital documents includes the reference to the non-existing web resource in an initially enabled state, and the executable code provides for an behavior inverse to that
20 described above for the initially disabled state.

In a further alternative example, the executable code injects (step 1-6) at its runtime a reference to request the non-existing web resource for the user device to issue this request to the web server. Code injection can be achieved from information in the digital document which is indistinguishable from content and hence, unobjectionable by an assumed running ad-blocking software.

25 More importantly, the code injection of a reference to request the non-existing web resource is done from information which is unspecific to a request, i.e. which does not result in the user device issuing a request to the web server. In this respect, requesting unspecific information included in the digital document must first be transformed by the executable code into a form corresponding to a reference to request the non-existing web resource and then must be injected at runtime to be later issued by the
30 user device.

Subsequently, the executable code may enable the user device to (re-)position (step 1-7) the display of an alternative advertisement associated with the non-existing web resource. In more detail, the reference to the non-existing web resource has an absolute position in the source code of the digital document and a relative position when displaying the associated alternative advertisement. This is,
35 however, optional and only useful in case of a mis-positioned reference to the non-existing web resource in the digital document.

Thereby, the executable code may adjust the relative position for displaying, i.e. thereby achieving the displaying of the associated alternative advertisement at an alternative position relative to its absolute position, where the displaying position, if provided as absolute position in the source code, could

immediately be recognized as advertisement (or would immediately reveal that the reference to the non-existing web resource is an advertisement).

5 The absolute and relative positions exist for a reference to the non-existing web resource, irrespective of whether the reference is included in the digital document or it is injected at runtime by the executable code. Nevertheless, the absolute position of web resources in a digital document is a property which is easily process-able by ad-blocking software and allows, in case of prominent positions of a displayed digital document, for good detection results of advertisements.

10 Advantageously, due to the positioning capabilities of the executable code, it becomes possible to disguise the relative position (or displaying position) of the reference to the non-existing web resource. Moreover, the reference to the non-existing web resource may be placed at varying absolute positions in a digital document and may be (re-) positioned such that it always has the same displaying position within the digital document.

15 Accordingly, for the (re-)positioning of the reference to the non-existing web resource, the executable code determines an offset between the absolute position of the reference to the non-existing web resource and the relative position intended for the displaying of the alternative advertisement associated with same non-existing web resource. For example, the offsets may result in negative pixel values.

20 Further, the executable code may allow the user device to post-process (step 1-12) a delivered alternative advertisement associated with a requested non-existing web resource. In this post-processing, the executable code processed the provided alternative advertisement for enabling the display to the user, and preferably, carries out inverse operations which are up-front performed as pre-processing on the web server. This is, however, optional and only useful in case the delivered alternative advertisement cannot be displayed without post-processing.

25 For example, should ad-blocking software be known to detect advertisements based on the existence of a specific color (for example magenta) in an image delivered as alternative advertisement to the user device, the pre-processing on the web server allows for the color modification prior to the delivery, and the post-processing allows for the inverse color modification on the user device.

30 Similarly, post-processing by the user terminal in an alternative implementation may include decoding, deciphering, reformatting using pre-defined functionality of the user device, or applying custom function(s) on the alternative advertisement that is (are) included in the executable code being provided by the web server.

35 Nevertheless, the above described positioning and processing functionality, which can be included in the executable code, shall be considered optional for the purpose of performing the error based advertisement delivery mechanism underlying this embodiment. This functionality merely provides supplemental functionality to render the delivered alternative advertisement indistinguishable over content.

40 Subsequently, the user device requests (step 1-8) in form of a communication message the delivery of the non-existing web resource from the web server in case of the detection of running ad-blocking software. The non-existing web resource is specified in or injected into the digital document such that request by the user device for its delivery by the web server results in an error at the web server.

Moreover, the error is invoked by the user device issuing the request for delivering the non-existing web resource because this non-existing web resource indeed does not exist on the web server.

Accordingly, in response to the request by the user device, the web server performs error processing and catches (step 1-9) the error invoked by the request from the user device. In other words, the error handling performed by the web server for catching the error copes with the fact that the non-existing web resource does not exist on the web server and hence cannot be delivered in response to the request by the user device.

For example, the error handling procedure to be performed by the web server is comparable to the procedure standardized by the Internet Engineering Task Force, IETF, RFC 2616 – “Hypertext Transfer Protocol -- HTTP/1.1” under section 10.4.5 as “404 Not Found”, whose disclosure is incorporated herein by reference. Specifically, for a 404 not found error, it is disclosed that this status code is to be reported if the web server has not found anything matching a Request-URI. Accordingly, in case of the 404 not found error, the web server also responds to a request for the delivery of the not-found web resource, namely a web resource which cannot be found by the web server.

In the embodiment, however, the web server delivers (step 1-13) in form of a communication message to the user device, instead of the non-existing web resource (or a 404 error code), an alternative advertisement associated with the non-existing web resource for display by the user device. In other words, the web server does not respond to the request indicating a 404 not found error code but instead refers to the pre-determined association between the non-existing web resource and the alternative advertisement.

Accordingly, the web server delivers to the user device an associated alternative advertisement for display such that the user device does not recognize that the alternative advertisement does not correspond to the requested non-existing web resource, but merely is a substitute for the requested non-existing web resource. In other words, the delivered web resource, existing on the web server and associated with the non-existing web resource as being the alternative advertisement, is delivered transparently to the user device in response to its request.

In summary, it shall be emphasized that the association between the non-existing web resource and the existing web resource to be delivered as alternative advertisement dispenses with the need for incorporating information on the alternative advertisement itself, thereby making it indistinguishable over content equally delivered by the web server to the user device and preventing from its detection by ad-blocking software.

In an exemplary implementation, the web server is provided with a temporary storage space for maintaining at least a temporary copy of the alternative advertisement therein. This temporary copy is delivered by the web server to the user device in response to the requested non-existing web resource. For this purpose, the web server may include a cache storage space from which at least the alternative advertisement associated with the non-existing web resource is supplied.

In an alternative exemplary implementation, the web server itself issues, in response to a request for the non-existing web resource by the user device, a request (step 1-10) in form of a communication message to a dedicated content server included in the communication system. The content server may also be referred to as advertising server. Notably, the web server requests from the content server

delivery of the associated alternative advertisement and not the delivery of the non-existing web resource.

5 In other words, the web server does not simply forward the request received from the user device but refers to the association established at the time of production of the digital document (cf. step 1-2 above). This association enables the web server to determine the alternative advertisement associated with the requested non-existing web resource prior to requesting delivery of the determined alternative advertisement from the content server.

10 In response to the requested alternative advertisement, the content server delivers (step 1-11) in form of a communication message to the web server same alternative advertisement associated with the non-existing web resource requested by the user device. The web server is, hence, capable of delivering this alternative advertisement to the user device in response to its request. Accordingly, the error based advertisement delivery mechanism is compatible with commonly utilized advertising server, and at the same time reduces the need for storage capacity on the web server.

15 Advantageously, the error based advertisement delivery mechanism allows for a personalized advertisement delivery to the user device. For this purpose, the request message for the non-existing web resource and the delivery message of the associated alternative advertisement both include identification information, for example a web cookie, temporarily stored on the user device.

20 In more detail, the request for the non-existing web resource includes identification information which identifies the user statistics to the web server. Similarly, the delivered alternative advertisement also includes identification information updating the user statistics on the user device. The user statistics may relate to the initially requested digital document or to the requested non-existing web resource. In any case, the communication of user statistics between the user device and the web server allows for a personalized advertisement delivery there-between.

25 Further, in case the communication system further comprises a content server for providing the alternative advertisement to the web server, the communication between the web server and the content server may include the same identification information for performing the personalized advertisement delivery on behalf of the user device. In this respect, the user statistics can also be forwarded to the content server and, hence, allows for an advantageous tracking of the user's behaviour at the content server.

30 The error based advertisement delivery mechanism described in this embodiment terminates when the user device retrieves the alternative advertisement delivered by the web server instead of the non-existing web resource, and displays the alternative advertisement as part of the digital document to the user.

35 In the following, examples are given for illustrating how a reference to a non-existing web resource can be realized. The examples of a non-existing web resource are given with reference to Hyper Text Markup Language, HTML, code samples, which shall however not be construed as limiting the approach to HTML type web servers only. Moreover, any different format may be used for communication between the user device and the web server which provides the functionality of the below described embodiments.

40

```

1 

```

Example 1: non-existing web resource referencing a JPG image

In the example 1, the reference to a non-existing web resource is given as a HTTP URI to an image in JPG format. As can be clearly seen from this example, the attributes of reference to the non-existing web resource are randomized in order to make it indistinguishable from content for ad-blocking software. Specifically, the path attribute on the web server is “/images/63/9/7/7/”, thereby referencing an arbitrary location on the web server and the name attribute is “2b2ef7ce4669c.jpg”, hence being absent of information disclosing the associated alternative advertisement. Similar considerations hold true for the style attribute including relative position information.

```

1 <span/div class="" id="abhorred-newhatched-difference"
2 style="margin-top: 187px; margin-left: 48px; top: -687px;
3 left: -58px;">
4     
5 </span/div>

```

Example 2: non-existing web resource referencing a class including a JPG image

In the example 2, the reference to a non-existing web resource is given as a HTTP class including a URI to an JPG image. As can be clearly seen from this example, the attributes of reference to the non-existing web resource are similarly randomized as in the previous example, additionally including the id of the class “abhorred-newhatched-difference” which equally is absent of information disclosing the associated alternative advertisement.

```

1 <iframe data-tenableSamplesProperty=
2     "/article/a2931.html" style="width:120px;
3     height:600px">
4 </iframe>
5 <iframe style="width:120px;height:600px"></iframe>

```

Example 3: non-existing web resource referencing an iframe including a link to a web page

In the example 3, the reference to a non-existing web resource is given as a iframe which includes, as data attribute a URI that itself can include an JPG image. As can be clearly seen from this example, the data attributes of the iframe includes a references to the non-existing web resource which, however, has to be injected at runtime by according processing through the executable code, resulting in an the sample code “<iframe src="/article/a2931.html" style="width:120px; height:600px"> </iframe>”. Notably, even the injected code is absent of information disclosing the associated alternative advertisement.

Further embodiments

Now, reference shall be made to a more detailed embodiment of the invention which allows for the error based delivery of clickable alternative advertisement to a user device. In other words, in this embodiment the error based advertisement delivery does not only result in the delivery of an alternative advertisement for display by the user device only, but the alternative advertisement is provided as being a clickable reference enabling the redirection to a separate digital document associated with the alternative advertisement.

This embodiment relies on the principles of the error based advertisement delivery can equally be combined with or integrated into functionality described with respect to in the previous embodiment. In other words, the various combinations with and integrations into that which has previously been described are omitted for reasons of brevity, which, however, shall not be construed as limiting the invention in any respect.

Specifically, the user device in this embodiment is equally running executable code that is provided by the web server including detecting whether or not ad-blocking software is run for blocking the display of an advertisement, and requesting from the web server a non-existing web resource resulting in an error at the web server, depending on whether or not the user device runs the ad-blocking software.

Subsequently, the web server in this embodiment is equally responding to the request for the non-existing web resource including catching the error invoked by the request from the user device, and delivering to the user device, instead of the non-existing web resource, an alternative advertisement associated with the non-existing web resource for display by the user device.

More specifically, in this embodiment the alternative advertisement is clickable, hence, the underlying digital document not only includes a reference to a first non-existing web resource associated with the alternative advertisement but also includes another references to a second non-existing web resource for a redirect to a different digital document, for example a web page, associated with the alternative advertisement.

In this respect, at the time of production of the digital document the web server establishes, in an exemplary implementation, an association between the first non-existing web resource and the alternative advertisement and another association between the second non-existing web resource for a redirect to a different digital document associated with the alternative advertisement. These associations are maintained at the web server for a predetermined amount of time which may be set to a time after which the web server no longer expects requests from the user device for either one of the first or second non-existing web resource.

Further, subsequent to the delivery of the alternative advertisement to be displayed by the user device, in response to a user interaction the user device requests from the web server the second non-existing web resource. The request for the second non-existing web equally results in an error at the web server.

The web server responds to the request for the second non-existing web resource including: catching the error invoked by the request from the user device, and redirecting the user device, instead of to the other non-existing web resource, to the digital document associated with the alternative advertisement.

In the following, examples are given for illustrating how two references to the first and second non-existing web resource can be realized.


```
1 <span/div class="" id="abhorred-newhatchd-difference"
2 style="margin-top: 187px; margin-left: 48px; top: -687px;
3 left: -58px;">
4     
7 </span/div>
```

Example 4: non-existing web resource referencing a class including a JPG image and a link target

In the example 4, the references to two non-existing web resources are given as a HTTP URIs, namely a first URI to an image in JPG format and a second URI to a HTTP web page. As can be seen from this example, the attributes of references to the two non-existing web resources are randomized in order to make them indistinguishable from content for ad-blocking software.

Specifically, the path attribute of the image on the web server is `"/images/63/9/7/7/"`, and the path attribute of the HTTP web page is `"/news/"`, where both are referencing an arbitrary location on the web server and the name attribute of the image is `"2b2ef7ce4669c.jpg"` and that of the HTTP web page is `"captains-paradox-prepare.html"`, where both are absent of information disclosing the associated alternative advertisement. Similar considerations hold true for the class, id, and the style attribute including relative position information.

```
1 <span/div class="" id="abhorred-newhatchd-difference"
2 style="margin-top: 187px; margin-left: 48px; top: -687px;
3 left: -58px;">
4     <a target="_blank" href="/news/captains-paradox-
5     prepare.html">
6         
7     </a>
8 </span/div>
```

Example 5: non-existing web resource referencing a class including a JPG image and a link target

In the example 5, a different syntax for the references to two non-existing web resources is given as a HTTP URIs, namely a first URI to an image in JPG format and a second URI to a HTTP web page. As can also be seen from this example, the attributes of the references to the two non-existing web resource are randomized in order to make them indistinguishable from content for ad-blocking software.

Specifically, the path attribute of the image on the web server is `"/images/63/9/7/7/"`, and the path attribute of the HTTP web page is `"/news/"`, where both are referencing an arbitrary location on the web server and the name attribute of the image is `"2b2ef7ce4669c.jpg"` and that of the HTTP web page is `"captains-paradox-prepare.html"`, where both are also absent of information disclosing the associated alternative advertisement. Similar considerations hold true for the class, id, and the style attribute including relative position information.

It is further recognized that the various embodiments may be implemented or performed using computing devices (processors). A computing device or processor may for example be general purpose processors, digital signal processors (DSP), application specific integrated circuits (ASIC), field programmable gate arrays (FPGA) or other programmable logic devices, etc. In addition, network interfaces such as radio transmitter and radio receiver and other necessary hardware may be provided in the apparatuses. The various embodiments of the invention may also be performed or embodied by a combination of these devices.

Further, the various embodiments may also be implemented by means of software modules, which are executed by a processor or directly in hardware. Also a combination of software modules and a hardware implementation may be possible. The software modules may be stored on any kind of computer readable storage media, for example RAM, EPROM, EEPROM, flash memory, registers, hard disks, CD-ROM, DVD, etc.

It should be further noted that the individual features of the different embodiments may individually or in arbitrary combination be subject matter to another invention. It would be appreciated by a person skilled in the art that numerous variations and/or modifications may be made as shown in the embodiments without departing from the spirit or scope of the invention as broadly described. The present embodiments are, therefore, to be considered in all respects to be illustrative and not restrictive.

Claims

1. A method for error based advertisement delivery to be performed by a communication system comprising a user device and a web server, the method comprising the steps of:
- 5 • running, by the user device, executable code that is provided by the web server including:
 - i. detecting whether or not ad-blocking software is run for blocking the display of an advertisement, and
 - 10 ii. requesting from the web server a non-existing web resource resulting in an error at the web server, depending on whether or not the user device runs the ad-blocking software;
 - responding, by the web server, to the request for the non-existing web resource including:
 - 15 iii. catching the error invoked by the request from the user device, and
 - iv. delivering to the user device, instead of the non-existing web resource, an alternative advertisement associated with the non-existing web resource for display by the user device.
2. The method according to claim 1, further comprising the steps of:
- 20 • requesting, by the user device, in response to a user interaction from the web server another non-existing web resource, the other non-existing web resource resulting in an error at the web server; and
 - responding, by the web server, to the request for the other non-existing web resource including: catching the error invoked by the request from the user device, and redirecting the user device, instead of to the other non-existing web resource, to a digital document associated with the alternative advertisement.
- 25 3. The method according to claim 1 or 2, wherein providing the executable code by the web server includes:
- producing a digital document that specifies the advertisement, and a content, both to be displayed on the user device,
 - embedding the executable code in the digital document, and
 - 30 • delivering the digital document, including the embedded executable code, to the user device.

4. The method according to claim 3, wherein the advertisement is pre-determined such that it enables the user device to accurately detect whether or not the ad-blocking software is run.
5. The method according to claim 3 or 4, wherein the produced digital document includes a reference to request the non-existing web resource.
- 5 6. The method according to claim 3 or 4, wherein the step of running the executable code by the user device further includes injecting at runtime a reference to request the non-existing web resource from request unspecific information included in the produced digital document.
7. The method according to claim 5 or 6, wherein, prior to providing the executable code by the web server, the method comprises the further step of:
 - 10 • associating, by the web server, the non-existing web resource with a existing web resource, to be delivered as associated alternative advertisement instead of the non-existing web resource by the web server.
8. The method according to claim 7, wherein associating the non-existing web resource with an existing web resource, includes randomizing at least one of:
 - 15 • an attribute of the non-existing web resource, including:
 - i. a path on the web server,
 - ii. an id,
 - iii. a name,
 - iv. a size,
 - 20 v. a class,
 - vi. a style attributed in the digital document;
 - a tag of the non-existing web resource; and
 - a position in the structure of the digital document.
9. The method according to one of claims 1 to 8, wherein the advertisement and the alternative advertisement are both a reference to a web resource, preferably, one of:
 - 25 • an embedded image in animated or non-animated form,
 - an embedded video, and
 - a digital document including a reference to an image in animated or non-animated form or to an embedded video.

10. The method according to one of claims 1 to 9, further comprising the step of:

- retrieving, by the user device, the alternative advertisement delivered by the web server instead of the non-existing web resource, including: displaying the alternative advertisement to the user.

5 11. The method according to claim 10, wherein retrieving the alternative advertisement by the user device further includes:

- post-processing the alternative advertisement as prescribed in the executable code being provided by the web server for enabling the display to the user, and preferably
- the alternative advertisement is pre-processed by the web-server prior to its retrieval by the user device.

10

12. The method according to claim 11, wherein processing the alternative advertisement by the user terminal includes:

- decoding, deciphering, reformatting using pre-defined functionality of the user device, or
- applying custom function(s) on the alternative advertisement that is(are) included in the executable code being provided by the web server.

15

13. The method according to one of claims 1 to 12, wherein the request for the non-existing web resource, and the delivery of the associated alternative advertisement instead of the non-existing web resource both include identification information for a personalized advertisement delivery to the user device, and

20

in case the system further comprises a content server for providing the alternative advertisement to the web server, the communication between the web server and the content server includes the same identification information for performing the personalized advertisement delivery on behalf of the user device.

25 14. A communication system for error based advertisement delivery, comprising:

- a user device configured to run executable code that is provided by the web server including:
 - i. detecting whether or not ad-blocking software is run for blocking the display of an advertisement, and
 - ii. requesting from the web server a non-existing web resource resulting in an error at the web server, depending on whether or not the user device runs the ad-blocking software,

30

- a web server configured to respond to the request for the non-existing web resource including:
 - v. catching the error invoked by the request from the user device, and
 - 5 vi. delivering to the user device, instead of the non-existing web resource, an alternative advertisement associated with the non-existing web resource for display by the user device.
15. A computer-readable medium storing instructions that when executed by a processor of a user device and of a web server in a communications system for error based advertisement delivery cause the user device and the web server to perform the respective steps:
- 10 • running, by the user device, executable code that is provided by the web server including:
 - i. detecting whether or not ad-blocking software is run for blocking the display of an advertisement, and
 - 15 ii. requesting from the web server a non-existing web resource resulting in an error at the web server, depending on whether or not the user device runs the ad-blocking software,
 - responding, by the web server, to the request for the non-existing web resource including:
 - vii. catching the error invoked by the request from the user device, and
 - 20 viii. delivering to the user device, instead of the non-existing web resource, an alternative advertisement associated with the non-existing web resource for display by the user device.

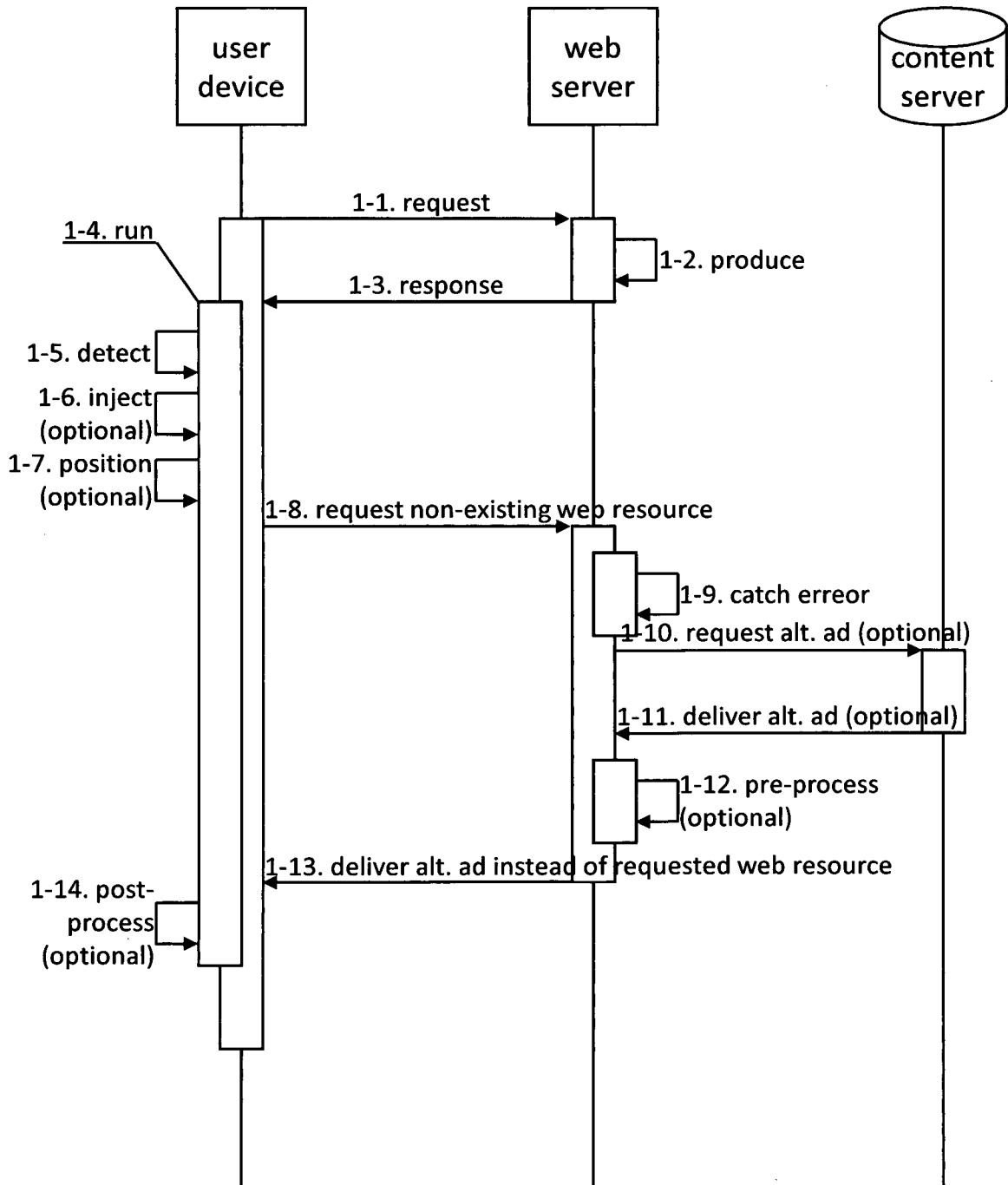


Fig. 1

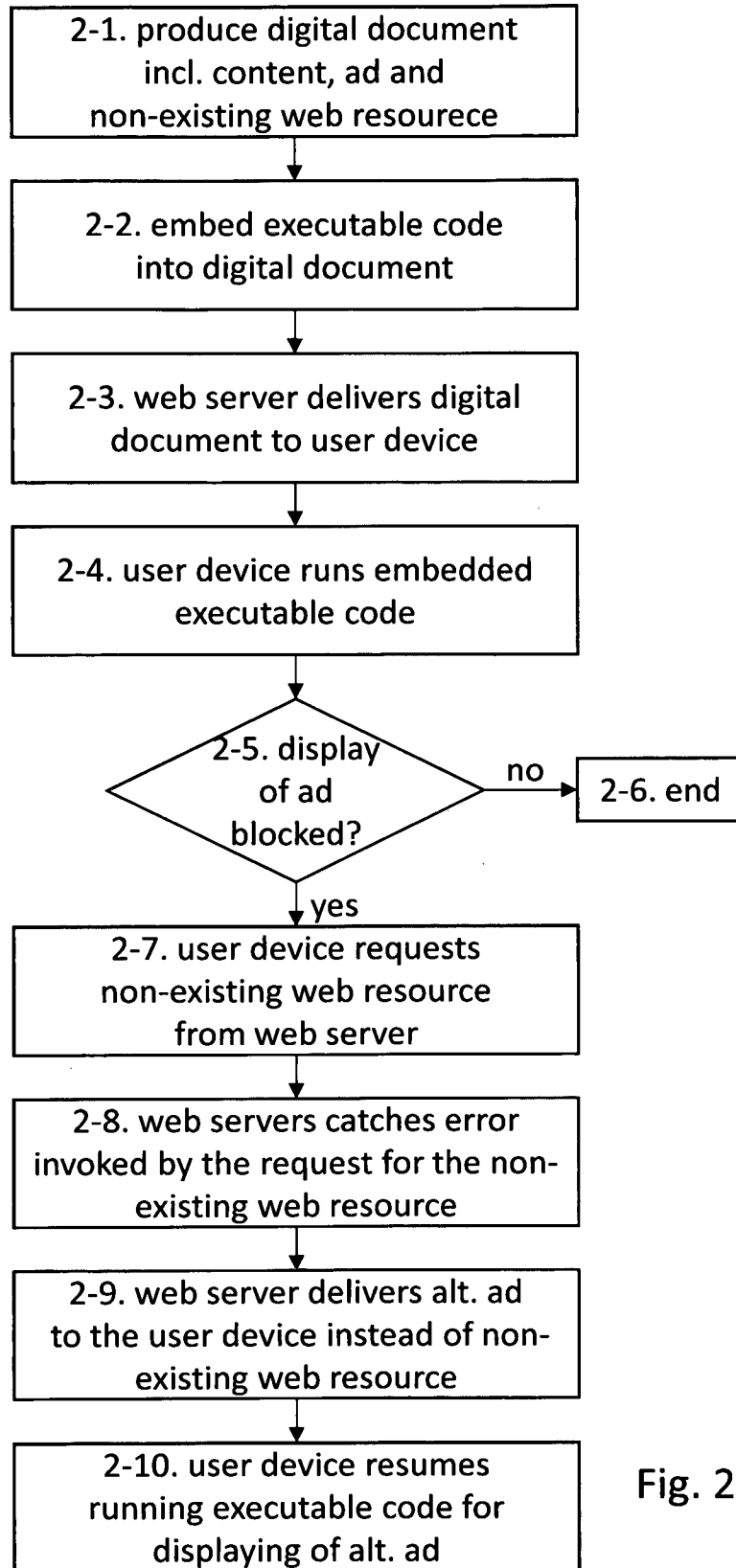


Fig. 2

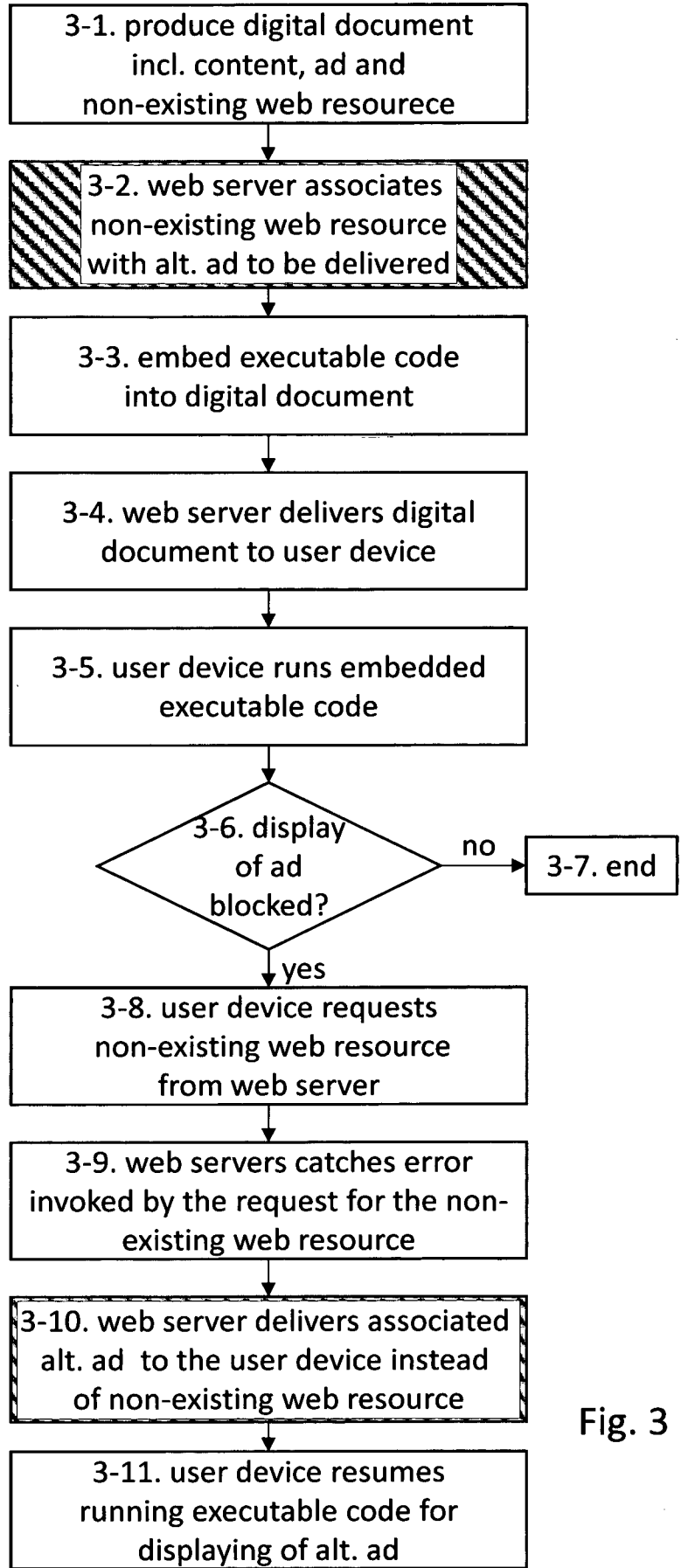


Fig. 3

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2015/002356

A. CLASSIFICATION OF SUBJECT MATTER
INV. G06Q30/02
ADD.
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED
Minimum documentation searched (classification system followed by classification symbols)
G06Q
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2014/229298 A1 (GRUN RAIMUND [DE]) 14 August 2014 (2014-08-14) paragraphs [0006], [0040] - [0041], [0060] - [0065] -----	1-15
X	US 2013/275595 A1 (HANSEN ROBERT [US]) 17 October 2013 (2013-10-17) paragraphs [0046] - [0050] ----- -/--	1-15

Further documents are listed in the continuation of Box C.

See patent family annex.

* Special categories of cited documents :

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier application or patent but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

- "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
- "&" document member of the same patent family

Date of the actual completion of the international search 12 February 2016	Date of mailing of the international search report 22/02/2016
Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Authorized officer Falò, Luca

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2015/002356

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	<p>Anonymous: "Forum référencement et webmarketing de WebRankInfo - Détecter adblock: le script anti-adblock (nouvelle version) : AdSense",</p> <p>16 November 2005 (2005-11-16), XP055107994, Retrieved from the Internet: URL:http://forum.webrankinfo.com/viewtopic.php?f=15&t=40296&start&view=print [retrieved on 2014-03-14] the whole document</p> <p style="text-align: center;">-----</p>	1-15

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/EP2015/002356

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2014229298 A1	14-08-2014	US 2014229298 A1	14-08-2014
		WO 2014122136 A1	14-08-2014

US 2013275595 A1	17-10-2013	US 2013275595 A1	17-10-2013
		WO 2013158679 A1	24-10-2013
