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(54) **Title:** METHOD AND MODULE FOR ENABLING CONTINUOUS ACCESS TO INTERNET WHEN PRIMARY NETWORK IS DISRUPTED

(57) **Abstract:** The present invention relates to a method for enabling continuous access to internet information and interactivity when primary network is temporarily disrupted, said method is characterized by providing a plurality of caching servers; clustering them into a group; selecting and converting one of the caching servers to become an access point; and the rest of the caching serves to become client caching servers; the access point gathers data from each client caching server and consolidates all the gathered data to form a complete data; synchronizing the data between the client caching servers within the group via the access point having the complete data by using a dedicated radio in addition to the existing network radio and WiFi radio; and each client caching server consolidates the received complete data with its own existing data to produce a duplicate copy of the complete data. The present invention also relates to a synchronization module for performing the aforesaid method.



METHOD AND MODULE FOR ENABLING CONTINUOUS ACCESS TO INTERNET WHEN PRIMARY NETWORK IS DISRUPTED

5 FIELD OF THE INVENTION

This invention relates generally to wireless networks. In particular, this invention relates to a method and a module for enabling continuous access to internet information and interactivity when primary network is temporarily disrupted.

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BACKGROUND OF THE INVENTION

A server stores objects in serialised form in cache. When a cache client requests an object from the cache, the server sends it to the client over the network. The cache client then de-serialises the object for use by the client application.

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When local cache is enabled, the cache client stores a reference to the object locally. This keeps the object active in the memory of the client application. When the application requests the object, the cache client first checks whether the object resides in the local cache. If so, the reference to the object is returned immediately
20 without contacting server. If it does not exist, the object is retrieved from the server. The cache client then de-serialises the object and stores the reference to this newly retrieved object in the local cache. The client application uses this same object. Caching allows client devices to locally store information for authenticating, session tracking and for remembering specific information about users such as
25 service preferences, browsing history, previous activities and the like.

Patent publication no. US 2013/0060885 A1 discloses a data caching module that determines a request from a device for specifying content data directed to a web server or a storage destination. However, with such approach, the invention may
30 have trouble with lagging due to heavy synchronization process that occurs in the ungrouped caching servers.

Patent publication no. US 2012/0284356 A1 discloses a wireless traffic management system cache optimization, but the synchronization in the invention may not be effective due to heavy synchronization that takes place simultaneously in ungrouped caching servers of the same network.

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A disclosure in patent publication no. US 2006/0015570 A1 states that the invention can only synchronize and store limited size objects in the local cache.

Another concern raised is most of the prior art documents do not concentrate on local data synchronization in high speed downlink packet access (HSDPA), for
10 example International publication no. WO 2006/111016 A1.

Accordingly, it can be seen in the prior art that there exists a need to provide a method for synchronising data in local cache for HSDPA user during offline use
15 without limiting the size of cache elements.

SUMMARY OF INVENTION

The present invention provides a method for enabling continuous access to
20 internet information and interactivity when primary network such as 3G wireless networks, high speed downlink packet access (HSDPA) network, or the like, is temporarily disrupted.

In general, the method works by allowing synchronization of data, such as cached
25 objects, between a plurality of caching servers that are clustered together to form a group by utilizing a dedicated radio in addition to the existing network radio (e.g. 3G radio, HSDPA radio, or the like) and WiFi radio.

Specifically, the method is characterized by the steps of providing a plurality of
30 caching servers; clustering the plurality of caching servers into a group; selecting and converting one of the caching servers within the group to become an access point; selecting and converting the rest of the caching serves within the group to

become client caching servers; the access point gathers data from each client caching server; the access point consolidates all the gathered data to form a complete data; synchronizing the data between the client caching servers within the group via the access point having the complete data by using a dedicated
5 radio in addition to the existing network radio and WiFi radio; and each client caching server consolidates the received complete data with its own existing data to produce a duplicate copy of the complete data.

The present invention also provides a synchronization module for enabling
10 continuous access to internet information and interactivity when primary network, such as 3G wireless networks, HSDPA network, or the like, is temporarily disrupted.

In particular, the synchronization module is characterized by a plurality of client
15 caching servers, an access point for gathering data from each client caching server and consolidating the said data to become a complete data, and a dedicated radio for synchronizing data between the client caching servers via the access point having the complete data in addition to the existing network radio and WiFi radio.

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DETAILED DESCRIPTION OF THE INVENTION

The above mentioned and other features and objects of this invention will become more apparent and better understood by reference to the following detailed
25 description. It should be understood that the detailed description made known below is not intended to be exhaustive or limit the invention to the precise disclosed form as the invention may assume various alternative forms. On the contrary, the detailed description covers all the relevant modifications and alterations made to the present invention, unless the claims expressly state
30 otherwise.

The core aspect of the present invention relates to a method for enabling continuous access to internet information and interactivity when primary network is temporarily disrupted. Generally, the present invention works by allowing a plurality of caching servers, which are clustered together, to synchronize data with each other through an access point by employing a dedicated radio in addition to the existing network radio and WiFi radio.

The wireless network in the present invention refers to 3G network, HSDPA network, or the like.

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The network radio in the present invention refers to 3G radio, HSDPA radio, or the like.

Particularly, the aforementioned method is characterized by the steps of providing a plurality of caching servers; clustering the plurality of caching servers into a group; selecting and converting one of the caching servers within the group to become an access point; selecting and converting the rest of the caching serves within the group to become client caching servers; the access point gathers data from each client caching server; the access point consolidates all the gathered data to form a complete data; synchronizing the data between the client caching servers within the group via the access point having the complete data by using a dedicated radio in addition to the existing network radio and WiFi radio; and each client caching server consolidates the received complete data with its own existing data to produce a duplicate copy of the complete data.

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To be more specific, the method starts by selecting a first caching server, and by default, making the first caching server as the access point. Thereafter, the first caching server starts to scan its neighborhood for a second caching server. Upon successfully scanning the second caching server, a couple of tests is performed on the second caching server before it is allowed to join the first caching server to form a group.

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The first test is a test to determine the speed of the second caching server. The first caching server will perform a received signal strength indication (RSSI) checking on the second caching server to determine the speed of the second caching server. When it is determined that the speed of the second caching server is at least less than -70 dBm, the second caching server is allowed to join the first caching server to form the group. This test ensures that the method of the present invention is performed with maximum speed, thus avoiding data lagging.

The second test is a test to determine whether the second caching server already belongs to another existing group of caching servers. If it is not, the second caching server is allowed to join the first caching server to form the group.

Consequently, a check on the MAC addresses of the first caching server and the second caching server is performed. The caching server with a higher MAC address will become the access point, whereas the caching server with a lower MAC address will become the client caching server. In this case, there are two scenarios. The first one being the first caching server has a higher MAC address than the second caching server, and therefore the first caching server remains as the access point and the second caching server becomes the client caching server. The second scenario being the second caching server has a higher MAC address than the first caching server, and therefore the second caching server replaces the first caching server to act as the new access point, forcing the first caching server to become the client caching server.

The aforementioned steps starting from the scanning part to the MAC addresses checking are carried on until the maximum number of caching servers that are allowed in a group has been reached. In the present invention, it is recommended that the group consists of no more than 20 caching servers. It also means that the group of 20 caching servers would have one caching server acting as the access point, and nineteen caching servers acting as the client caching servers.

Subsequently, the access point will gather all the data from each client caching

server, and consolidates the gathered data to form a complete data. The data synchronization between the client caching servers is performed when the data within the client caching servers are different from the complete data within the access point. It is carried out by having the access point to furnish the client
5 caching servers with the complete data through the dedicated radio. Note that this dedicated radio is an addition to the existing network radio and WiFi radio. With this dedicated radio, the speed of the existing network radio and WiFi radio will not be affected. Upon receiving the complete data, each client caching server will consolidate the complete data with its own existing data, therefore producing a
10 duplicate copy of the complete data.

Another aspect of the present invention relates to a synchronization module for enabling continuous access to internet information and interactivity when primary network is temporarily disrupted, characterized by a plurality of client caching
15 servers, an access point for gathering data from each client caching server and consolidating the data to become a complete data, and a dedicated radio for synchronizing data between the client caching servers via the access point having the complete data in addition to the existing network radio and WiFi radio.

CLAIMS

1. A method for enabling continuous access to internet information and interactivity when primary network is temporarily disrupted, the method is
5 characterized by the steps of:
 - a) providing a plurality of caching servers;
 - b) clustering the plurality of caching servers into a group;
 - c) selecting and converting one of the caching servers within the group to become an access point;
 - 10 d) selecting and converting the rest of the caching serves within the group to become client caching servers;
 - e) the access point gathers data from each client caching server;
 - f) the access point consolidates all the gathered data to form a complete data;
 - 15 g) synchronizing the data between the client caching servers within the group via the access point having the complete data by using a dedicated radio in addition to the existing network radio and WiFi radio; and
 - h) each client caching server consolidates the received complete data
20 with its own existing data to produce a duplicate copy of the complete data.
2. A method in accordance with claim 1, wherein the wireless network is 3G network, or HSDPA network.
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3. A method in accordance with claim 1, wherein the network radio is 3G radio, or HSDPA radio.
4. A method in accordance with claim 1, wherein the caching servers are
30 clustered into a group consisting of no more than 20 caching servers.
5. A method in accordance with claim 1, wherein the caching server within the

group with the highest MAC address is selected as the access point and the rest of the caching servers within the group with MAC addresses lower than the just selected access point are selected as the client caching servers.

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6. A method in accordance with claim 1, wherein the data synchronization is performed when the data within the client caching servers are different than the complete data within the access point.

- 10 7. A method in accordance with claim 1, wherein the speed of the caching servers is at least less than -70 dBm.

8. A method in accordance with claim 7, wherein the speed of the caching servers is determined by performing a received signal strength indication (RSSI) checking on the caching server.

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9. A synchronization module for enabling continuous access to internet information and interactivity when primary network is temporarily disrupted, the module is characterized by:

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- a) a plurality of client caching servers;
- b) an access point for gathering data from each client caching server and consolidating the data to become a complete data; and
- c) a dedicated radio for synchronizing data between the client caching servers via the access point having the complete data in addition to the existing network radio and WiFi radio.

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10. A module in accordance with claim 9, wherein the wireless network is 3G network, or HSDPA network.

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INTERNATIONAL SEARCH REPORT

International application No

PCT/MY2014/000102

A. CLASSIFICATION OF SUBJECT MATTER
 INV. H04L29/08 G06F17/30
 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)
 H04L G06F

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.
Y	US 2009/157766 A1 (SHEN JINMEI [US] ET AL) 18 June 2009 (2009-06-18) abstract; claims 1-15; figures 1-6 paragraph [0007] - paragraph [0012] paragraph [0026] - paragraph [0030] paragraph [0046] - paragraph [0047] paragraph [0048] paragraph [0052] - paragraph [0053] paragraph [0054] - paragraph [0055] paragraph [0032] - paragraph [0033] paragraph [0034]	1-10
Y	US 2009/046655 A1 (ZHAO XIAOMING [US] ET AL) 19 February 2009 (2009-02-19) abstract paragraph [0020] - paragraph [0032] ----- -/-	1-4,6-10



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

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"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

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INTERNATIONAL SEARCH REPORT

International application No

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C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 2006/036856 A1 (KOK WILSON [US]) 16 February 2006 (2006-02-16) paragraph [0040] paragraph [0061] - paragraph [0062] -----	5

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

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