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(54) Title: METHOD AND SYSTEM TO BROADCAST EMERGENCY ALERT MESSAGE USING IEEE 802.11 BASED WI-FI ACCESS POINT

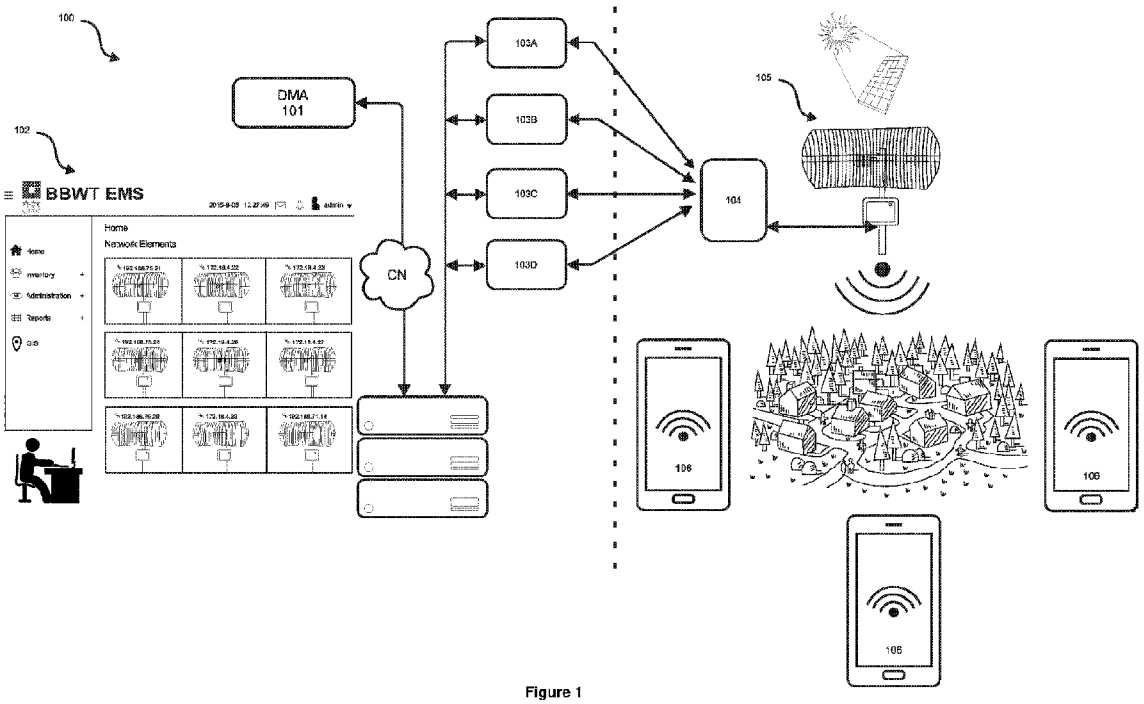


Figure 1

(57) Abstract: The present invention relates to method and system to broadcast emergency alert message using IEEE 802.11 based Wi-Fi access point where the access points are configured to receive the alert messages to be broadcast and the access points broadcast the messages in the form of Service Set Identification (SSID) and mobile alerts. The system comprises a communicating node (CN) configured to communicate common alert protocol (CAP) messages to a network operation center server (102) by an Alerting Authority (101) such as a disaster management authority server and the network operating center server (102), IEEE 802.11 based Wi-Fi access point, and end user devices (106). The present invention utilised to inform the people with time sensitive information such as early announcement of disaster in one go through public Wi-Fi infrastructure which is assumed to be available in such places.

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METHOD AND SYSTEM TO BROADCAST EMERGENCY ALERT MESSAGE USING IEEE 802.11 BASED WI-FI ACCESS POINT

TECHNICAL FIELD OF THE INVENTION

The present invention relates to a method and a system to broadcast emergency alert message using IEEE 802.11 based Wi-Fi access point where the access points are configured to receive the alert messages to be broadcast and the access points broadcast the messages in the form of Service Set Identification (SSID) and mobile alerts.

BACKGROUND OF THE INVENTION

Availability of communication systems during disaster relief operations is crucial. The wireless systems are expected to perform at their best in hostile conditions with limited resources since thousands of lives are at stake. Various man-made and natural disasters have highlighted the need for more effective systems to aid in warning and rescue operations. There are two common problems that come up during disasters. The first is the lack of communication systems to send early disaster warnings and emergency alerts and to transmit emergency information that aid rescue in operations. The second is lack of access to affected areas for the rescue operations due to the dangers involved.

The networks currently used during disaster relief have a number of issues which include interoperability of devices between first responder organizations, network congestions and network speed.

One kind of a wireless emergency alert (WEA) system is disclosed in US Patent No. 9,271,135 which receives a geo-targeted federal alert that is to be delivered to mobile devices within a defined geographic region. A database of locations of Wi-Fi access points is utilized by the system to identify those access points that are likely present in the defined region. The system identifies mobile devices that have an ongoing IP multimedia subsystem (IMS) session with the identified Wi-Fi access points, in part by maintaining and accessing a look-up table containing location information for the Wi-Fi access point and connected mobile devices. Thus, the user device is required to be IMS-enabled to receive the alert messages and it is required to have active session with IEEE 802.11 compliant access point.

Another kind of wireless emergency alert system and method thereof are disclosed in US 20180235015A1 that includes a first network connection for connecting to a wireless local area network, a processor communicatively coupled to the first network connection, and a display communicatively coupled to the processor. The system is directed to a wireless local area network (WLAN) access point. The method includes comparing, by access point, an access point location of the wireless access point to the geographic area and, based on the comparing, confirming that the access point location is within the geographic area. The alert is relayed by the access point to a plurality of devices connected to the WLAN via the wireless access point. In this system, access point does not determine directly the location of geographic area. Also, it does not send any alert message to other access points in that area.

Still another kind of situation alert system and method are disclosed in US2010191453A1 which include identifying geographic coordinates of the situation in response to receiving situation information. A communication device located within a geographic distance from the geographic coordinates may be identified. A network address of the communication device may be determined. A route for a user of the communication device to avoid the situation may be determined and communicated in a message to the communications device. The message may include an indication of the situation and the determined route to notify the user of the situation and route to avoid the situation.

The common problem observed in the existing systems is that the systems require an active session or IMS enabling with Wi-Fi access point to receive the alert message. Further, there is also a requirement of a connection to a cellular network where receiving a WEA message from an emergency alert server is associated with a cellular network provider. Furthermore, the alert message is forwarded to mobile phone that is connected to the access point which is located in a target area for a given alert. However, these traditional alert systems do not offer the ability to reach the devices like mobile, laptop or tablet which are not connected to Wi-Fi access point and also do not send the alert message to all access points of the target area. Therefore, it will be advantageous to develop a system and method that are able to send an alert message to devices that are connected or not connected to the access point in a given location.

The present disclosure is directed to overcome one or more of the problems as set forth above.

OBJECTS OF THE INVENTION

An object of the present invention is to provide an emergency alert system, and a method for broadcasting alert message to end user devices connected to all IEEE 802.11 based Wi-Fi access points in the alert target area.

Another object of present invention is to provide system which is able to send the alert message without requiring an active session with IEEE 802.11 compliant access point.

SUMMARY OF THE INVENTION

In an aspect of the invention there is provided a method for broadcasting an emergency alert message through IEEE 802.11 based Wi-Fi Access Points. The method comprises detecting a target location of a geographic area being affected or likely to be affected by a disaster and acquiring the dataset associated with the disaster by an Alerting authority (DMA) (such as disaster management authority server); sending common alerting protocol (CAP) message to a network operation center server by the Alerting authority via a communicating node (CN); retrieving the target location information from the CAP message by the network operation center server; preparing a sub-list of access points located within the target location where the CAP message is required to be sent by the network operation center server, sending the CAP message to the sub-list of the access points, wherein the common alerting protocol messages are converted into a plurality of custom messages by the access points; and broadcasting the custom messages to a plurality of end user devices at a same time via IEEE 802.11 Wi-Fi links from the access points located within the target location.

In another aspect of the invention there is provided a system to broadcast an emergency alert message. The system comprises a communicating node (CN) configured to communicate common alerting protocol (CAP) messages to a network operation center server by an alerting authority such as disaster management authority server, the disaster management authority server detects dataset associated with a target location in a

geographic area being affected or likely to be affected by a disaster. The system further comprises a network operating center server configured to retrieve a target location information within the geographic area for broadcasting the common alerting protocol message sent by the alerting authority, to prepare a sub-list of access points located within the target location; wherein the common alerting protocol messages are converted into a plurality of custom messages by the access points. Furthermore, the system comprises a mechanism to broadcast the plurality of custom messages, received from the access points, to a plurality of end user devices at a same time.

In an embodiment of the present disclosure, the custom messages are received in form of notification when the end user device is connected to the Wi-Fi.

In an embodiment of the present disclosure, the end user device is not connected to Wi-Fi, and then the custom message is displayed as a list of service set identification (SSID) when the end user device goes into Wi-Fi scanning mode.

In an embodiment of the present disclosure, the sub-list maintains the internet protocol (IP) address and media access control(MAC) address of the access points for message communication.

In still another embodiment of the present disclosure, the alert message in form of CAP messages are transferred from network center to the access points via the intermediate links like satellite based backhaul or Wi-Fi based backhaul or 4G based backhaul.

In an embodiment of the present disclosure, the communicating node is adapted for communicating the CAP message to the network operating centre server via telephonic communication, video communication, and short message services.

In another embodiment of the present disclosure, the end user devices are mobile phone or tablet device or laptop device.

In another embodiment of the present disclosure, the custom messages are sent in form of single service set identification-based configuration or multiple service set identification-based message configuration.

In yet another embodiment of the present disclosure when the end user device is connected to the IEEE 802.11 based Wi-Fi access points, the custom messages are received in form of notification.

In still another embodiment of the present disclosure, the end-user devices are not connected with IEEE 802.11 based Wi-Fi access points, then the custom message is displayed as a list of service set identification (SSIDs) when the end user goes into Wi-Fi scanning mode.

In still another embodiment of the present disclosure, the intermediate links includes multiple satellite based backhaul or Wi-Fi based backhaul or 4G based backhaul for sending the alert message in the form of CAP message from Network Center to Access Points

In still another embodiment of the present disclosure, the common alerting protocol message received at the network center is sent to the access points identified in sub-list without modification.

In still another embodiment of the present disclosure, the access points run an application on a port which receives the common alerting protocol message sent from the network operating center server.

In still another embodiment of the present disclosure, the end user devices are mobile phone or tablet device or laptop device.

These and other features, aspects, and advantages of present subject matter will become better understood in detailed description reference to the drawings that follows. This summary is provided to introduce a selection of concepts in a simplified form. This

summary is not intended to identify key features or essential features of the subject matter, nor is it intended to be used to limit the scope of the subject matter.

BRIEF DESCRIPTION OF ACCOMPANYING DRAWINGS

The above and other features, aspects, and advantages of the subject matter will be better understood with regard to the following description and accompanying drawings:

FIG. 1 shows a system level schematic illustration of an emergency alert system operable to implement aspects of the present invention.

FIG.2 is a flow chart of a method for emergency communication using Wi-Fi accordance with a non-limiting implementation of the present disclosure.

FIG. 3 is a flow chart of a method for emergency communication using a Wi-Fi network in accordance with a non-limiting implementation of the present disclosure.

FIG.4 is a block diagram of a wireless communication system in accordance with a non-limiting implementation of the present disclosure.

DETAILED DESCRIPTION OF THE INVENTION

For convenience, the terms used herein have the meanings recognized and known to those of skill in the art, however, for convenience and completeness, particular terms and their meanings are set forth below.

The terms “comprise” and “comprising” are used in the inclusive, open sense, meaning that additional elements may be included. It is not intended to be construed as “consists of only”. Throughout this specification, unless the context requires otherwise the word “comprise”, and variations such as “comprises” and “comprising”, will be understood to imply the inclusion of a stated element or step or group of element or steps but not the exclusion of any other element or step or group of element or steps.

Unless defined otherwise, all technical and scientific terms used herein have the same meaning as commonly understood by one of ordinary skilled in the art to which this disclosure belongs. Although any methods and materials similar or equivalent to those described herein can be used in the practice or testing of the disclosure, the preferred methods, and materials are now described.

IEEE802.11 beacon message has a parameter field called Service Set Identification (SSID). This SSID field is broadcast over the air in 2.4GHz or 5 GHz frequency channels when Access Point (AP) is configured and made up. An AP in a Wireless local area network (WLAN) is recognised from its SSID. Any user mobile/tablet/laptop which wishes to connect to a particular AP searches for its SSID and taps it to connect for network access. The SSID can be hidden or seen on user's equipment depending on the configuration/setting on AP. As per IEEE 802.11 specification, the SSID field is 0-32 octets which means SSID can be 32- character long. The variable length of SSID field allows a network operator to relay any message in the form of SSID within the allowed limit of 32 characters like short message service (SMS) to the end user devices (mobile/tablets/laptops). This is being referred to as SSID based messaging.

Also, IEEE 802.11 specification allows creating 16 virtual Access Points on a single Radio. This means 16 such SSIDs can be configured on single radio Access Point. This means 16 different messages can be broadcast from a single AP at the same time.

It maps to sending 16 No. of different SMS to a group of people at a same time. This feature can be utilised to inform the people with time sensitive information such as early announcement of disaster (wind, rain, earthquake, fire, evacuation, safety and any other message etc.) in one go through public IEEE 802.11 based Wi-Fi infrastructure which is assumed to be available in such places.

The present system and method don't require an active session with IEEE 802.11 compliant access point. The end user devices can receive alert message in two situations:

- when the end user device is connected to IEEE 802.11 compliant access point in a given location, the alert message is displayed through an application already installed on the device.
- when the end user device is not connected to IEEE 802.11 compliant access point in a given location, the alert message is displayed as a list of SSIDs when device goes into Wi-Fi scanning mode.

The end user devices can be provided with an android application for instant notification of the information.

With reference to FIG. 1, an Emergency Alert System (100) is illustrated according to the present invention. The system (100) comprises an alerting authority such as disaster management authority/agency (DMA) server (101) coupled to a network operation centre (NOC) server (102) operable to transmit different types of targeted alerts to one or more access points (105) located within a target area through different types of back hauls/intermediate links (103A, 103 B, 103 C, 103 D) and remote end equipment (104). The one or more end user devices (106) may be coupled to the network operating centre server through one or more access points. The DMA server (101) is operable to send a common alert protocol (CAP) message via communicating node (CN) like telephonic calls, audio, video to the NOC server (102) for transmission to one or more end-user devices (106) like mobile, laptop/tablet/computer positioned in a specific target area, such as a village, town, or district or state or other region, as described in more detail below. In some implementations of the present technology, Global Positioning System (GPS) is used as a positioning module to determine the target location/site/area of disaster; it should be appreciated that other techniques can be used to determine the location to a degree of accuracy commensurate with the technique used. NOC server transmits the CAP messages issued by the DMA server (101) such as a disaster management authority server. For example, under WEA, the network operating centre (NOC) may transmit alerts issued by disaster alerting authority (DMA), alerts involving imminent threats to safety or life like rain, fire, earthquake, immediate evacuation at some location/area. In addition to specifying one or more target areas, an alert message may also include various instructions for responding to an emergency. For example, an alert message may warn residents of an approaching tornado or hurricane and direct residents to available storm shelters.

In the event of an act of terrorism, natural disaster, or other emergency, the NOC, as the principal operations centre for DMA, coordinates and integrates information from NOC components to provide situational awareness as appropriate, to ensure that accurate and critical terrorism-related and disaster-related information reaches government decision makers in a timely manner. The DMA server sends the CAP message to the NOC server

via a communicating node. The available communicating nodes are telephonic communication via telephone/mobile, video communication via smart phone/laptop/tablet/computer, and short message services or multimedia message services via mobile devices.

Additionally, the NOC serves as the national fusion centre, collecting and synthesizing all-source information, including information from state and major urban-area fusion centres, for all threats and hazards. The DMA server (101) may send the CAP message to NOC server (102), the message including location of geographical area (e.g. latitude, longitude) being affected by disaster. The operator at NOC server (102) retrieves the information regarding the target location/site/area. The operator at NOC server (102) configures the SSID of the access points with "message to be broadcasted by disaster management authority" through element management system (EMS).

The NOC server (102) has a database of all the Access Points with their location co-ordinates. The NOC server (102) receives a CAP message from the DMA server (101). It retrieves location information and type of alert from the CAP message. NOC server (102) compares the location information (retrieved from CAP) and prepares a sub-list of Access point where CAP message require to be sent. The sub-list also maintains Internet Protocol (IP) address and media access control (MAC) address of these Access Points for message communication. The CAP message received at NOC is sent to the Access Point (on a particular port number) identified in sub-list without any modification. The Access Points runs an application on a particular port which can receive the CAP message sent from the NOC.

Each access point can serve multiple end user devices (106) within a defined network area; as people move beyond the range of one access point, they are automatically handed over to the next one. A database of locations of Wi-Fi access points is utilized by the system to identify those access points that are likely present in the target area/region. Optionally, wireless access point may prepare a sub-lists of access points to determine whether wireless access point is located within (or within a range of) target area or not. For example, wireless access point may use this preliminary check as a requirement to be met before broadcasting or communicating the alert messages to the end user devices

connected to the access points. The access points located within the target area broadcast the custom messages in form of SSID based message configuration. Also, single or multiple SSID based message configuration can be done as per requirement. Thus, the custom messages are sent in form of single Service set identification or multiple service set identification based message configuration.

The Access Points perform two types of functions to alert the end user devices (106):

- For all the end user devices (106) which are connected to access point: Access Point converts the CAP message into a custom message with alert information and sends this custom message to all the end user devices (106) connected to it in unicast or broadcast message format. The connected devices receive this information using an application and activate various kinds of alerts such as vibration, ringtone etc.
- For all the devices which are in that location but not connected to Access Points: Network Operation Centre (102) converts the CAP message into a custom message with alert information and create multiple virtual access points with SSID as Alert Message on the Access Points available at the targeted location. When devices (not connected to Access point) scan Wi-Fi, they will get a visual indication of the custom message in the form of SSIDs.

Backhaul such as Optical based (103A), satellite based (103B), Long-Term Evolution (LTE) based (103C), Wi-Fi based (103D) and the like that may be used for NOC server connectivity with the remote end equipment (104). In a hierarchical telecommunications network the backhaul portion of the network comprises the intermediate links (103) between the core network, or backbone network, and the small sub-networks at the edge of the network. The end-user devices (106) may be coupled to one or more IEEE 802.11 based Wi-Fi access points (105). The Access Point (105) is connected to remote end equipment (104) using ethernet link. The custom messages are broadcast by access points (105) to the end user devices (106) via the IEEE 802.11 based Wi-Fi Links.

The end user devices (106) may be any of a variety of mobile devices, such as wireless phones, Unlicensed Mobile Access, handheld computers, smartphones, media players, and the like that are enabled for use within at least the target area. Further, the end user

devices (106) may include personal computers, tablets, physical devices, like lighting equipment, televisions, home appliances, or the like; sensors or sensor-equipped systems, including health monitors, biometric sensors, sensors that track statistics on objects, environments, or other things; vehicles, including manned and unmanned vehicles, whether or not autonomous, robotic devices, machinery, and the like. The end user devices (106) may include other network-connected devices, including servers and backend systems. Devices may include Internet of things devices and devices that may communicate with devices. The end user devices (106) may include devices that communicate through networks or technology other than cellular networks, such as those having 802.11 connectivity.

With regard to FIG. 2, a flow chart of a method for communicating emergency alert is provided. The method starts at step 201. At step 201, geographic coordinates at which a disaster is occurring or expected to occur is detected by disaster management authority (DMA)/Alerting Agency. The geographic coordinates may indicate both distance and direction of a disaster site. The alert notification may be received at a communications system of the disaster management authority, weather service, or any other service provider. The DMA server (101) is configured to detect a target location of a geographic area being affected or likely to be affected by a disaster and acquiring the dataset associated with the disaster. At step 202, the DMA server (101) sends a common alert protocol (CAP) message to a network operating centre server (102) via communicating node (CN) using telephonic call, audio or video message. At step 203, the information regarding target area located within the geographic area from the geographic coordinates and disaster information may be identified/retrieved. At step 204, sub-list of IEEE802.11 based Wi-Fi access points (105) located in the target location is prepared and the CAP message is sent from the network operating centre server (102) via a plurality of intermediate links (103A, 103B, 103C, 103D) through the remote end equipment (104) to the sublist of access points. At step 205, the CAP message is converted into a custom message including one or more instructions by the access points. At step 206, a plurality of custom messages is broadcast to a plurality of end-user devices (106) via IEEE 802.11 Wi-Fi based access points (105).

Referring still to FIG. 3, the method and system further comprises generated CAP message provided by disaster management authority (DMA) server (101). The CAP

messages are converted into the custom messages by the one or more access points (105). At step 301, the method comprises transmitting/broadcasting the custom message via one or more access points (105) to the designated recipients/end user devices (106) located within the target location. At step 302, the end user devices are communicated with the alert through two modes by the access points, whether it is connected to IEEE 802.11 based Wi-Fi or not. At step 303, the custom messages are received in form of notification when the end user devices are connected to the IEEE 802.11 based Wi-Fi access point. At step 304, the end user is not connected to IEEE 802.11 based Wi-Fi, then the alert messages are displayed as a list of SSIDs, when the end user device goes into Wi-Fi scanning mode. Thus, no active session is required to receive the CAP message.

Referring still to FIG. 4 which illustrates the block diagram of the present disclosure. The emergency alert system (100) comprises an Alerting Authority (101) such as disaster management authority server, a network operating centre (102), intermediate backhaul links (103), and remote end equipment (104), IEEE 802.11 based Wi-Fi access points (AP) (105) configured to providing Wi-Fi connection to the end-user devices (106).

ADVANTAGES OF THE INVENTION

Advantages of the IEEE 802.11 Wi-Fi based disaster site management architecture is that it involves sending multiple numbers of different messages to a group of people at the same time. This feature can be utilised to inform the people with time sensitive information such as early announcement of disaster in one go through public Wi-Fi infrastructure which is assumed to be available in such places. Mobile vibration, alarm etc. can be configured for instant notification to user.

WE CLAIM

1. A method to broadcast an emergency alert message through IEEE 802.11 based Wi-Fi Access Points, comprising:

detecting a target location of a geographic area being affected or likely to be affected by a disaster and acquiring the dataset associated with the disaster by a disaster management authority (DMA) server (101);

sending common alerting protocol (CAP) message to a network operation center server (102) by the disaster management authority server (101) via a communicating node (CN);

retrieving the target location information from the CAP message by the network operation center server (102);

preparing a sub-list of IEEE 802.11 based Wi-Fi access points (105) located within the target location where the CAP message is required to be sent by the network operation center server (102), sending the CAP message to the sub-list of the access points (105) located within the target location via a plurality of intermediate links (103) and the remote end equipment (104), wherein the CAP messages are converted into a plurality of custom messages by the access points (105); and

broadcasting the custom messages to a plurality of end user devices (106) at a same time from the IEEE 802.11 based Wi-Fi access points (105) located within the target location.

2. The method as claimed in claim 1, wherein the custom messages are received in form of notification when the end user device (106) is connected to IEEE 802.11 based Wi-Fi access point.

3. The method as claimed in claim 1, wherein the end user device (106) is not connected to IEEE 802.11 based Wi-Fi access point, then the custom message is displayed as a list of service set identification (SSIDs) when the end user device (106) goes into Wi-Fi scanning mode.

4. The method as claimed in claim 1, wherein the sub-list maintains the Internet protocol (IP) address and media access control (MAC) address of the access points for message communication.

5. The method as claimed in claim 1, wherein the custom messages are broadcast by the access points (105) to the end user devices (106) via the IEEE 802.11 based Wi-Fi connection.

6. The method as claimed in claim 1, wherein the communicating node (CN) is adapted for communicating the CAP message to the network operating centre server (102) via telephonic communication, video communication, and short message services.

7. The method as claimed in claim 1, wherein the end user devices (106) are mobile phone or tablet device or laptop device and pre-installed with application to display emergency alert messages.

8. The method as claimed in claim 1, wherein the custom messages are sent in form of service set identification, single or multiple service set identification (SSID) based message configuration.

9. A system (100) to broadcast an emergency alert message using IEEE 802.11 based access points, the system (100) comprising:

a communicating node (CN) configured to communicate common alert protocol (CAP) messages to a network operation center server (102) by an Alerting Authority (101) such as a disaster management authority server, the disaster management authority server detects dataset associated with a target location in a geographic area being affected or likely to be affected by a disaster;

the network operating center server (102) configured to retrieve a target location information within the geographic area for broadcasting the CAP messages sent by disaster management authority server (101);

prepare a sub-list of access points (105) located within the target location; wherein the CAP messages are converted into a plurality of custom messages by the access points;

a plurality of intermediate links (103) and remote end equipment (104) to send the CAP messages to sub-list of access points (105) located within the target location; and

broadcasting the custom messages to IEEE 802.11 Wi-Fi compliant end user devices (106) from the access point (105).

10. The system (100) as claimed in claim 9, wherein when the end user devices (106) are connected to the IEEE 802.11 based Wi-Fi access point, the custom messages are received in form of notification.

11. The system (100) as claimed in claim 9, wherein when the end-user devices (106) are not connected with IEEE 802.11 based Wi-Fi access point, then the custom message is displayed as a list of service set identification (SSIDs) when the end user device goes into Wi-Fi scanning mode.

12. The system (100) as claimed in claim 9, wherein the custom message may receive at the end-user devices (106) via remote end equipment (104).

13. The system (100) as claimed in claim 9, wherein the intermediate links (103) include multiple satellite based backhaul or Wi-Fi based backhaul or 4G based backhaul along with the remote end equipment (104) for sending the received CAP messages to the sub-list of access points (105) located within the target location.

14. The system (100) as claimed in claim 9, wherein the CAP message received at the network operations center (102) is sent to the access points (105) identified in sub-list without modification.

15. The system (100) as claimed in claim 9, wherein the access points (105) run an application on a port which receives the CAP message sent from the network operating center server (102).

16. The system (100) as claimed in claim 9, wherein the end user devices (106) are mobile phone or tablet device or laptop device.

17. The system (100) as claimed in claim 9, wherein the end user devices (106) are pre-installed with an application to display the emergency alert messages.

AMENDED CLAIMS
received by the International Bureau on 19 July 2019 (19.07.2019)

WE CLAIM

1. A method to broadcast an emergency alert message through IEEE 802.11 based Wi-Fi Access Points, comprising:

detecting a target location of a geographic area being affected or likely to be affected by a disaster and acquiring the dataset associated with the disaster by a disaster management authority (DMA) server (101);

sending common alerting protocol (CAP) message to a network operation center server (102) by the disaster management authority server (101) via a communicating node (CN);

retrieving the target location information from the CAP message by the network operation center server (102);

preparing a sub-list of IEEE 802.11 based Wi-Fi access points (105) located within the target location where the CAP message is required to be sent by the network operation center server (102), sending the CAP message to the sub-list of the access points (105) located within the target location via a plurality of intermediate links (103) and the remote end equipment (104), wherein the CAP messages are converted into a plurality of custom messages by the access points (105); and

broadcasting the custom messages to a plurality of end user devices (106) at a same time from the IEEE 802.11 based Wi-Fi access points (105) located within the target location; wherein no active IMS session is required between the user device and the IMS core network to receive the alert message.

2. The method as claimed in claim 1, wherein the custom messages are received in form of notification when the end user device (106) is connected to IEEE 802.11 based Wi-Fi access point.

3. The method as claimed in claim 1, wherein the end user device (106) is not connected to IEEE 802.11 based Wi-Fi access point, then the custom message is displayed as a list of service set identification (SSIDs) when the end user device (106) goes into Wi-Fi scanning mode.

AMENDED SHEET (ARTICLE 19)

4. The method as claimed in claim 1, wherein the sub-list maintains the Internet protocol (IP) address and media access control (MAC) address of the access points for message communication.

5. The method as claimed in claim 1, wherein the custom messages are broadcast by the access points (105) to the end user devices (106) via the IEEE 802.11 based Wi-Fi connection.

6. The method as claimed in claim 1, wherein the communicating node (CN) is adapted for communicating the CAP message to the network operating centre server (102) via telephonic communication, video communication, and short message services.

7. The method as claimed in claim 1, wherein the end user devices (106) are mobile phone or tablet device or laptop device and pre-installed with application to display emergency alert messages.

8. The method as claimed in claim 1, wherein the custom messages are sent in form of service set identification, single or multiple service set identification (SSID) based message configuration.

9. A system (100) to broadcast an emergency alert message using IEEE 802.11 based access points, the system (100) comprising:

a communicating node (CN) configured to communicate common alert protocol (CAP) messages to a network operation center server (102) by an Alerting Authority (101) such as a disaster management authority server, the disaster management authority server detects dataset associated with a target location in a geographic area being affected or likely to be affected by a disaster;

the network operating center server (102) configured to retrieve a target location information within the geographic area for broadcasting the CAP messages sent by disaster management authority server (101);

prepare a sub-list of access points (105) located within the target location; wherein the CAP messages are converted into a plurality of custom messages by the access points;

a plurality of intermediate links (103) and remote end equipment (104) to send the CAP messages to sub-list of access points (105) located within the target location; and

access point (105) broadcast the custom messages to IEEE 802.11 Wi-Fi compliant end user devices (106) from the access point (105); wherein no active IMS session is required between the user device and the IMS core network to receive the alert message.

10. The system (100) as claimed in claim 9, wherein when the end user devices (106) are connected to the IEEE 802.11 based Wi-Fi access point, the custom messages are received in form of notification.

11. The system (100) as claimed in claim 9, wherein when the end-user devices (106) are not connected with IEEE 802.11 based Wi-Fi access point, then the custom message is displayed as a list of service set identification (SSIDs) when the end user device goes into Wi-Fi scanning mode.

12. The system (100) as claimed in claim 9, wherein the custom message may receive at the end-user devices (106) via remote end equipment (104).

13. The system (100) as claimed in claim 9, wherein the intermediate links (103) include multiple satellite based backhaul or Wi-Fi based backhaul or 4G based backhaul along with the remote end equipment (104) for sending the received CAP messages to the sub-list of access points (105) located within the target location.

14. The system (100) as claimed in claim 9, wherein the CAP message received at the network operations center (102) is sent to the access points (105) identified in sub-list without modification.

15. The system (100) as claimed in claim 9, wherein the access points (105) run an application on a port which receives the CAP message sent from the network operating center server (102).

16. The system (100) as claimed in claim 9, wherein the end user devices (106) are mobile phone or tablet device or laptop device.

17. The system (100) as claimed in claim 9, wherein the end user devices (106) are pre-installed with an application to display the emergency alert messages.

STATEMENT UNDER ARTICLE 19 (1)

With reference to the search report and written opinion of the International Searching Authority [ISA/IN], we are suitably amending the claims to address the novelty objections raised in the written opinion of ISA/IN.

1. The claim 1 has been suitably amended by addition of "***wherein no active IMS session is required between the user device and IMS core network to receive the alert message***." *with the* support of the amendment is found on page 7, lines 24-25 of as-filed specification.

2. *The claim 9 has been suitably amended* by addition of "***access point (105)***" *with the support of the amendment is found on original claim 9.*

3. *The claim 9 has been suitably amended* by addition of *"**wherein no active IMS session is required between the user device and IMS core network to receive the alert message.**" with the* support of the amendment is found on page 7, lines 24-25 of as-filed specification.

4. *The claim 9 has been suitably amended by deletion of "broadcast**~~ing~~**" and "**~~from access point (105)~~**".*

In view of above, the Applicant undertakes that no new subject matter has been added in claims and the amended claims do not go beyond the disclosure of the international application as-filed and have no impact on the description and drawings as filed.

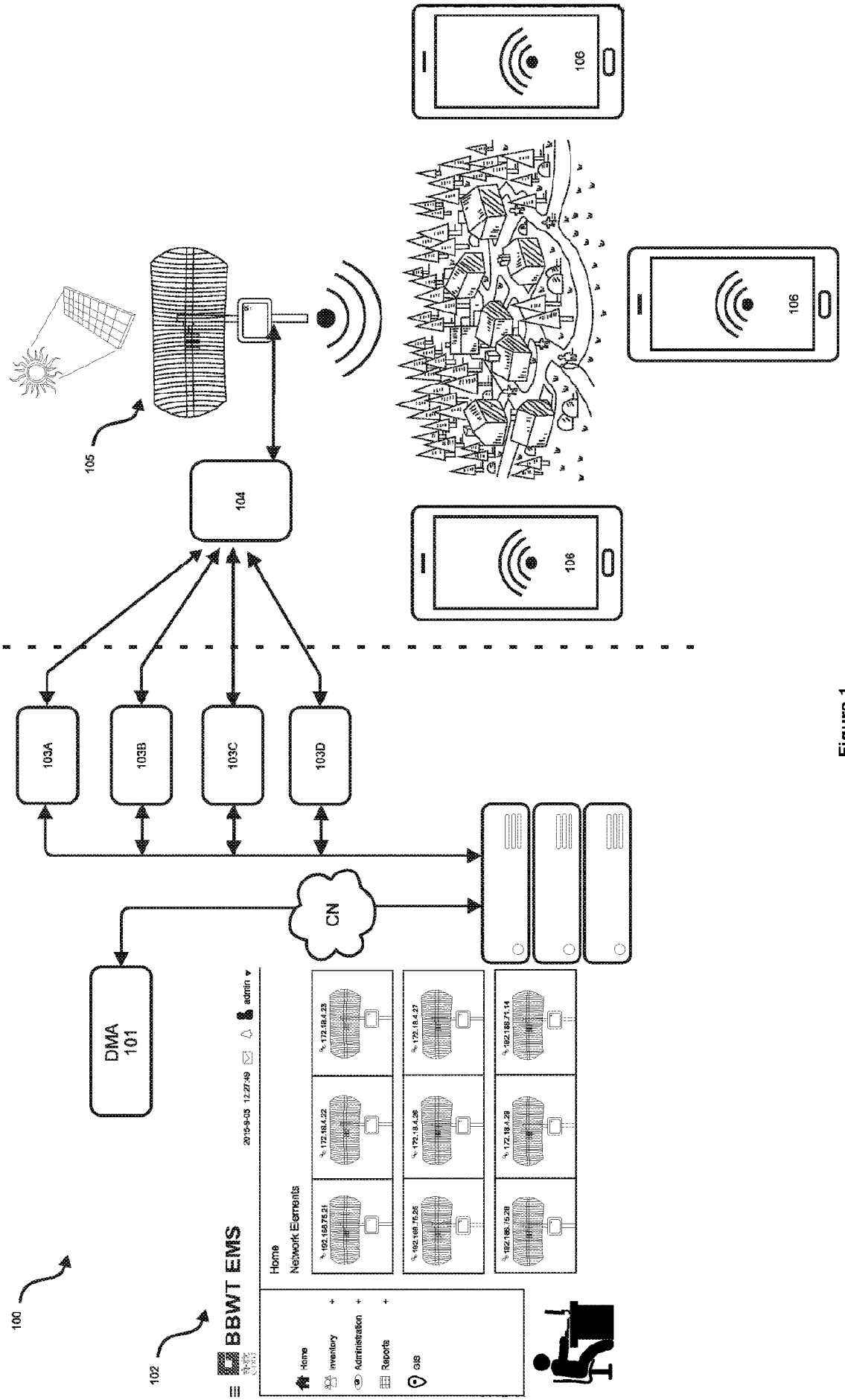

100
102
BBWT EMS
Home
Inventory
Administration
Reports
GIS
Home
Network Elements
admin
DMA
101
CN
103A
103B
103C
103D
104
105
106
106
106

Figure 1

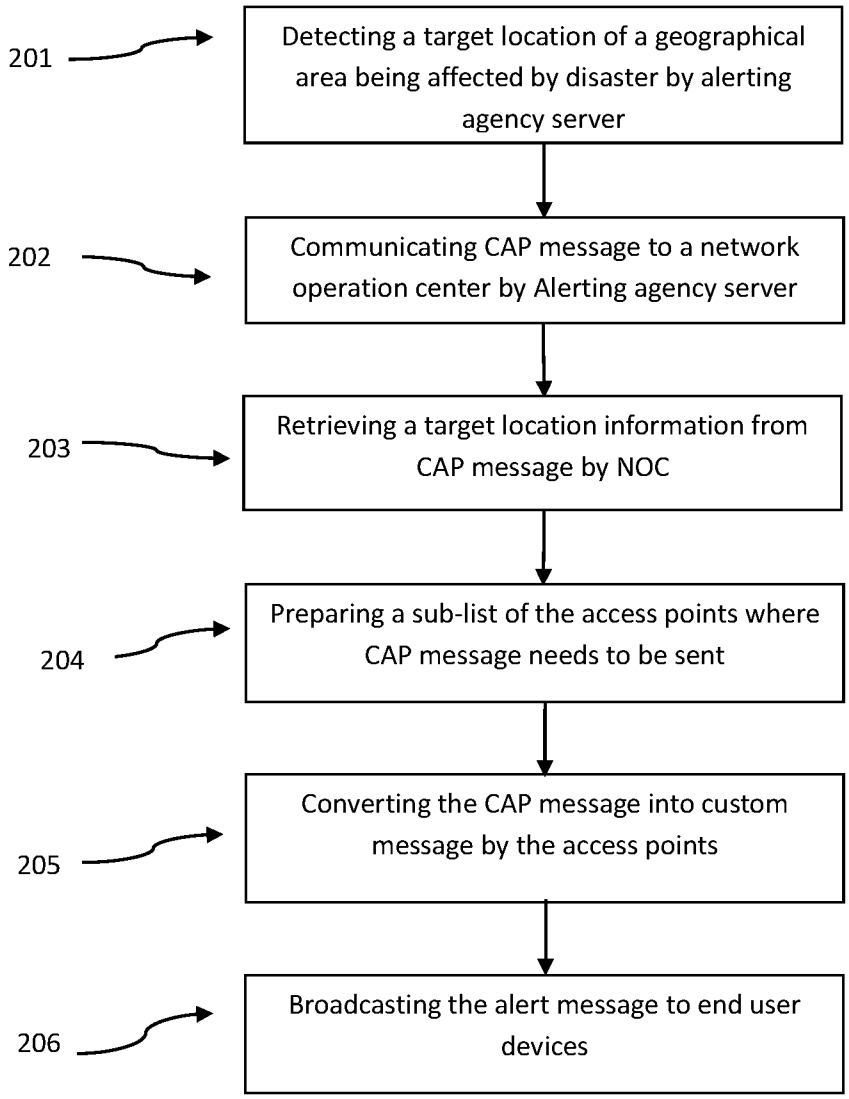

201
Detecting a target location of a geographical area being affected by disaster by alerting agency server
202
Communicating CAP message to a network operation center by Alerting agency server
203
Retrieving a target location information from CAP message by NOC
204
Preparing a sub-list of the access points where CAP message needs to be sent
205
Converting the CAP message into custom message by the access points
206
Broadcasting the alert message to end user devices

Figure 2

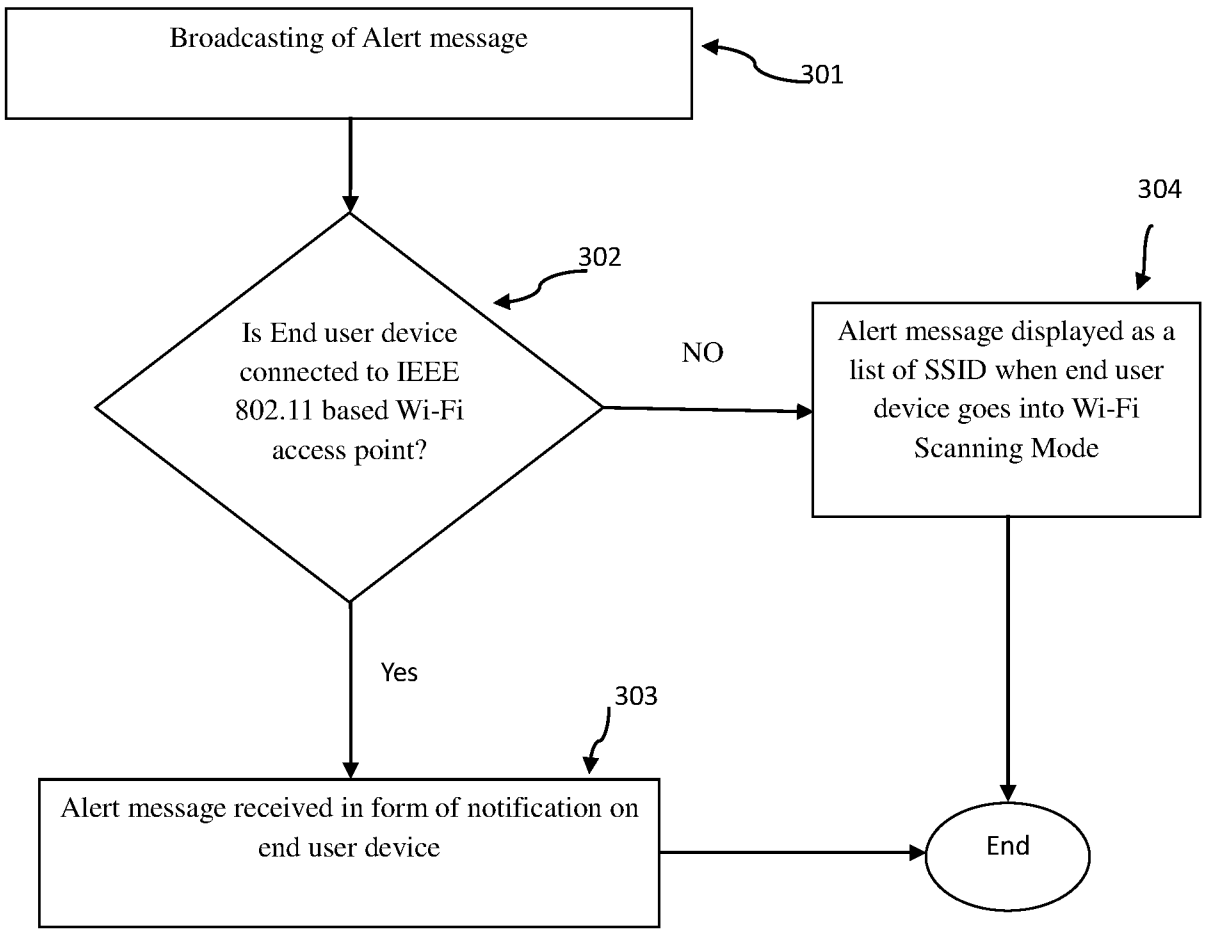

Broadcasting of Alert message
301
304
302
Is End user device connected to IEEE 802.11 based Wi-Fi access point?
NO
Alert message displayed as a list of SSID when end user device goes into Wi-Fi Scanning Mode
Yes
303
Alert message received in form of notification on end user device
End

Figure 3

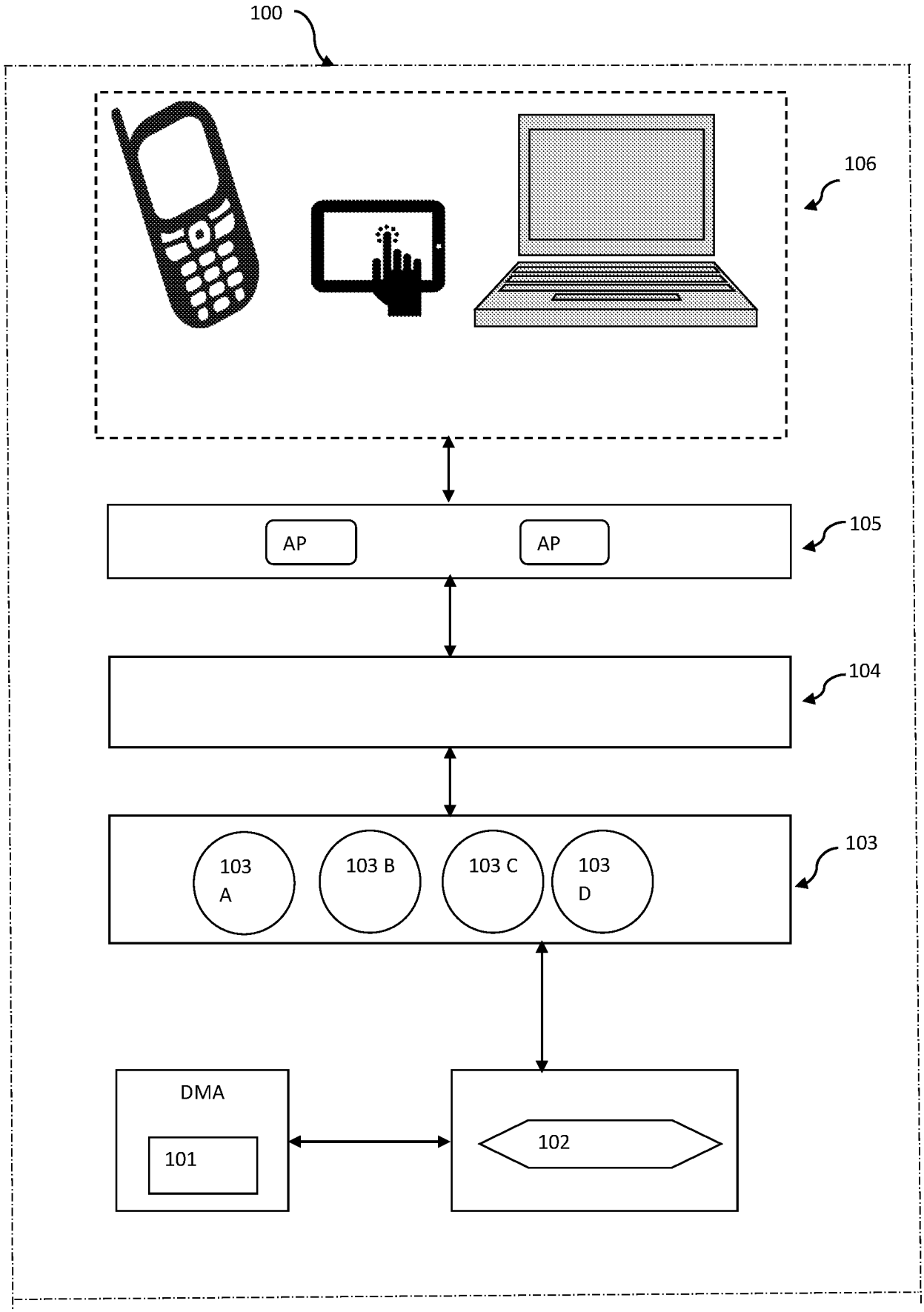


Figure 4

INTERNATIONAL SEARCH REPORT

International application No.
PCT/IN2019/050177

A. CLASSIFICATION OF SUBJECT MATTER
H04W4/00 Version=2019.01

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)

H04W

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)

DATABASES:- IPO INTERNAL, TOTAL PATENT ONE
KEYWORDS:- ACCESS POINTS, LOCATION, AFFECTED, ALERT, MESSAGE, CAP

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US9271135 B2(T MOBILE USA INC[US]) 23 FEBRUARY 2016(23-02-2016) ABSTRACT; LINES 5-17, 33-43, 48-67 of COLUMN 4, LINES 1-16, 25-59 of COLUMN 5, LINES 24-38 of COLUMN 7 , LINES 61-67 of COLUMN 10, LINES 1-12 of COLUMN 11; FIGURES 1-3	1-17

☐ 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	Date of mailing of the international search report
22-05-2019	22-05-2019
Name and mailing address of the ISA/ Indian Patent Office Plot No.32, Sector 14,Dwarka,New Delhi-110075 Facsimile No.	Authorized officer Saurabh Dwivedi Telephone No. +91-1125300200

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/IN2019/050177

Citation	Pub.Date	Family	Pub.Date
US 9271135 B2	23-02-2016	US 2014273911 A1	18-09-2014
		US 2016174054 A1	16-06-2016
		US 9596583 B2	14-03-2017
		US 2017150336 A1	25-05-2017
		US 9820126 B2	14-11-2017