



(51) International Patent Classification:
H04W 12/04 (2009.01) *H04W 28/18* (2009.01)

(21) International Application Number:
PCT/GB2009/000830

(22) International Filing Date:
27 March 2009 (27.03.2009)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
0805806.7 31 March 2008 (31.03.2008) GB
0805804.2 31 March 2008 (31.03.2008) GB

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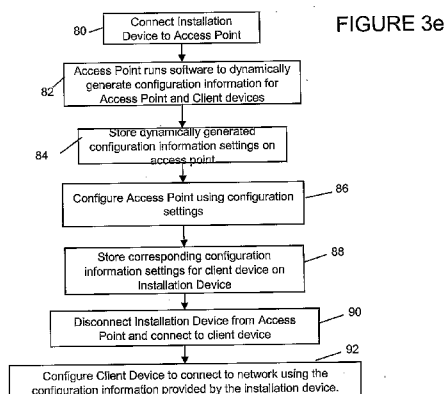
(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

— with international search report (Art. 21(3))

(54) Title: METHOD OF INSTALLING A WIRELESS NETWORK



(57) Abstract: A method of configuring a wireless network access point, the method comprising: connecting an installation device having a memory to the access point; triggering the automatic generation on the access point of wireless network configuration information, wherein said automatically generated configuration information comprises at least a wireless network identifier for identifying network traffic as belonging to the wireless network provided by the access point; configuring the access point using said automatically generated configuration information; and storing on said installation device corresponding configuration information

METHOD OF INSTALLING A WIRELESS NETWORK

The present invention relates to a method of installing a wireless communications network comprising a wireless access point and at least one client terminal using an installation device
5 and related aspects.

In particular but not exclusively, the invention relates to a method for installing and configuring a wireless communications network using a computer terminal by connecting the computer terminal to an installation device which enables a wireless connection to a wireless
10 communications network access point to be formed during the installation process.

In particular but not exclusively, the invention relates to a method of installing a wireless communications network by configuring a wireless communications network access point. The access point is configured triggering the generation of wireless network configuration
15 settings on the access point which are subsequently transferred to those client terminals which are to use that access point by connecting a portable data storage device to the access point which is then subsequently connected to the client terminal.

Figure 1 of the drawings shows how a computer apparatus (also referred to herein as a client device or client terminal) can be configured to connect to a pre-existing wireless communications network 1 as known in the art. In Figure 1, a wireless access point 2 (for
20 example, a wireless communications router or hub type device) is connected via a communications link 4 to a first computer 6 which has previously been used to configure the wireless network 1. In order to connect other apparatus to the wireless network 1, for example to connect another computer (shown in Figure1 as a laptop computer 8), the apparatus 8 must be configured to attach to the correct wireless network if more than one
25 network is detected and to use the correct encryption key to enable communications exchanged with the access point 2 to be secure. This requires the installation of appropriate software and appropriate wireless communications hardware. It is known in the art to provide such hardware, e.g., an antenna, in an integrated form with a Universal Serial Bus memory
30 stick type device 10.

Wireless communication needs to be secure so that communication transmissions are private, whether they carry voice or data, which is achieved by encrypting the transmissions.
35 In order to install a wireless network securely, the network needs to be identified somehow and an encryption key used to encode the transmissions over the network. A wireless network identifier well known in the art comprises an "SSID", or Service Set Identifier. The SSID of a wireless local area network (LAN) is a code which identifying the wireless LAN and which distinguishes packets from different LANs operating in the same location.

Two main encryption methods are well-known in the art for wireless networks, WEP and WPA. Wireless Equivalency Privacy (WEP) is supported by the vast majority of 802.11a/b equipment and is capable of using 40-bit or 64-bit keys (or longer) to encrypt data between the client device 6,8 and access point (AP) 2. The Wi-Fi Protected Access (WPA) provides slightly stronger encryption and can use a variety of schemes, either a shared private key, unique keys assigned to each user, or SSL certificates to authenticate the client/access point. The encryption WPA keys can even be rotated over time using Temporal Key Integrity Protocol (TKIP). Both WEP and WPA encryption techniques require a security key to be provided to the AP 2 generating the wireless network and which matches that provided to each client device 6,8 which is to communicate with the AP 2.

As a result, to install a wireless communications network such as that shown in Figure 1 of the accompanying drawings requires the person installing the apparatus to manually configure each client device 6,8 which is to connect with the AP 2 with the appropriate encryption key and network identifier for the network that particular AP 2 is to provide (assuming the AP 2 has been suitably preconfigured, if not then they must first configure the AP and provide the equivalent information to the client devices 6,8).

However, such known installation processes have a high-level of user involvement. The SSID and encryption WPA or WEP must be provided to the AP and each client device, and as these require a long and complicated series of digits and/or letters, there is a high chance of user error occurring resulting in the network not being appropriately installed on the AP and/or client devices or if installed, not being configured to operate in a secure manner.

To make things simpler for a user of the client device to complete the installation process, it is known in the art to pre-configure an access point device with a given SSID and WEP key and to provide a label on the access point device indicating the SSID and WEP key of that specific device. A user who is installing the network then reads the label and provides the SSID and WEP key information to the client device they are configuring to use the access point in the form of additional data when prompted to do so by a network installation program running on the client device.

However, even simplifying matters to this level results in a complex task. For example, the level of user input requires a long series of keystrokes to be correctly entered to generate the encryption keys and to enable the correct wireless network to be identified. As a result, there is still a reasonably high opportunity for human error to occur when inputting the additional data required to configure the wireless network. Another limitation which remains with this installation method is that process remains time-consuming, typically taking several minutes (of the order of five to ten minutes for a typical user).

The present invention seeks to provide a method for installing a wireless communications network which overcomes the limitations known in the art by suitably configuring the nodes which participate in the wireless communications network in a faster and more reliable manner by reducing the amount of the wireless network configuration information that a user is required to provide at least once in prior art wireless communications network installation processes, and preferably to removing any need for a user to ever enter manually wireless network configuration information during a wireless communications network installation process.

One aspect of the invention seeks to provide a method of installing a wireless communications network comprising:

configuring a first wireless network node with wireless network configuration settings, wherein said settings are generated automatically and dynamically during the network configuration of said first wireless network node;

connecting a portable data store to said first wireless network node and storing thereon said wireless network configuration settings;

subsequently connecting said portable data store to another wireless network node to automatically configure said other wireless network node with said wireless network configuration settings,

wherein at least one of said first wireless network node and said other wireless network node comprises a wireless communications network access point, and

wherein at least one of said first wireless network node and said other wireless network node comprises a client terminal,

whereby said wireless communications network access point is automatically configured to provide said wireless communications network and said client terminal is automatically configured to have access to said wireless communications network.

At least one of said wireless network configuration settings may comprise a wireless communications network security key.

At least one of said wireless network configuration settings may comprise a wireless communications network identifier.

One aspect of the invention seeks to provide a method of configuring a wireless network access point, the method comprising: connecting an installation device having a memory to the access point; triggering the automatic generation on the access point of wireless network configuration information, wherein said automatically generated configuration information comprises at least a wireless network identifier for identifying network traffic as belonging to the wireless network provided by the access point; configuring the access point using said

automatically generated configuration information; and storing on said installation device corresponding configuration information.

5 A wireless communications network may be installed using the wireless network configuration settings stored on the installation device by subsequently connecting the installation device to one or more client terminals.

10 One aspect of the invention seeks to provide a method of configuring a wireless network access point, the method comprising: triggering the automatic generation on the access point of wireless network configuration information, wherein said automatically generated configuration information comprises at least a wireless network identifier for identifying network traffic as belonging to the wireless network provided by the access point; and configuring the access point using said automatically generated configuration information to provide a wireless network.

15 A method may further comprise connecting an installation device capable of connecting to a client device, the installation device comprising portable data storage means, to the access point; and storing on said installation device corresponding wireless network configuration information capable of enabling said client device to have wireless connectivity with said access point when said installation device subsequently connects to said client device.

25 In this way, the wireless network configuration information stored on said installation device corresponds to the wireless network configuration of said access point. Both the installation device and the access point are configured with said wireless network configuration information prior to said installation device being connected to any client terminal arranged to connect to said access point, i.e., prior to the installation of the wireless network, the installation device is provided with the wireless network configuration information for that particular access point. After this, the same installation device can be used on one or more client devices (or equivalently, client terminals, a term used synonymously herein with client device to refer to an appropriate communications enabled computing platform) to provide the client devices with the wireless network configuration information the client device needs to attach to the wireless network provided by the wireless access point.

35 The wireless network configuration information may be dynamically generated during the installation of the wireless communications network.

The connection of an installation device may trigger the automatic generation of the configuration information on the access point.

The automatic generation of said configuration information may be triggered manually by a user.

The configuration information may replace previous configuration information stored on said access point.

The installation device may be manually disconnected from the access point after storing the wireless network configuration information which was automatically generated by the wireless network access point. Subsequently, the installation device may be connected to the client device. The installation device may be arranged to provide said stored corresponding wireless network configuration information to said client device to enable the client device to connect to a wireless network which is provided by said access point using said automatically generated wireless network configuration settings.

The configuration information may further comprise a wireless communications encryption key, generated programmatically on the access point using a pseudo-random process.

Another aspect of the invention relates to an installation device comprising non-volatile memory storing information arranged to implement appropriate steps in a method aspect.

Another aspect of the invention relates to a wireless communications network access point comprising:

- means to provide a wireless communications network;

- means to trigger the generation of automatic wireless communications network configuration information;

- means to connect to a portable data storage device;

- means to transfer said automatically generated wireless network configuration information to said portable data storage device.

The wireless communications network access point aspect of the invention may be arranged to be configured using any appropriate method aspect of the invention.

The wireless network access point may further comprises one or more transmission control components and/or data processors collectively arranged to:

- respond to said triggering means to initiate the automatic generation on the access point of wireless network configuration information, wherein said automatically generated configuration information comprises at least a wireless network identifier for identifying network traffic as belonging to the wireless network provided by the access point; and

configure the access point using said automatically generated configuration information to provide a wireless network.

5 Another aspect of the invention relates to a wireless network installed and configured using any of the above method aspects.

Another aspect of the invention relates to a wireless network installed and configured using any of the above wireless network access points and/or any installation device aspects.

10 Another aspect of the invention relates to a method of configuring a client device to have wireless connectivity with a wireless network access point, the method comprising:

15 automatically generating on the client device wireless network configuration information, wherein said automatically generated configuration information comprises at least an encryption key for encrypting wireless transmissions between the client device and the access point;

configuring the client device using said configuration information;

storing corresponding configuration information on an installation device comprising data storage means and connected to the client device;

20 detaching said installation device from said client device and attaching said installation device to said access point;

providing said wireless network configuration information stored on said installation device to the access point, whereby said corresponding configuration information is automatically used by said access point to configure a wireless network provided by the access point.

25 The wireless network configuration information may be dynamically generated during the installation of the wireless communications network.

30 The wireless network configuration information may be generated programmatically on the client device using a pseudo-random process during the dynamic execution of generic wireless network installation software on the client device.

35 The configuration information may be provided to the access point by the client device transmitting the information to the access point, wherein the wireless network provided by the access point uses a wireless network identifier which matches a corresponding wireless network identifier provided by said installation device to the client device.

40 The configuration information for the access point may be provided by disconnecting the installation device from the client device and reconnecting the installation device to the access point.

The configuration information may further comprise a wireless network identifier generated programmatically in an automated manner on the client device.

5 Another aspect of the invention relates to an installation device for installing a wireless network using a wireless network access point and at least one client terminal, the installation device comprising:

data storage means; and

a connector for connecting to said client terminal,

10 wherein said data storage means comprises non-volatile memory arranged to store information enabling the installation of a wireless communications network, wherein said wireless network configuration information is derived from wireless network configuration information automatically generated on said client device and comprises at least an encryption key for encrypting wireless transmissions over a wireless network which is stored
15 on the installation device in a form capable of being subsequently used by said wireless network access point to configure its wireless network to a form which said client device is capable of automatically attaching to.

The connector may be arranged to connect to said client device to enable wireless network
20 configuration information to be written to said memory by said client device.

Another aspect of the invention relates to an access point comprising:

means to connect to an installation device aspect of the invention; and

25 a data interface arranged to receive the wireless configuration information from the installation device aspect.

The above aspect and other aspects of the invention are as set out by the accompanying independent claims and the preferred embodiments by the accompanying dependent claims. Those of ordinary skill in the art will be aware that the aspects of the invention and any
30 preferred embodiments may be suitably combined in any appropriate manner.

Embodiments of the invention will now be described with reference to the accompanying drawings, which are by way of example only, and in which:

35 Figure 1 shows a wireless communications system as known in the art;

Figure 2 shows an arrangement of apparatus suitable for implementing a wireless method of installing a wireless communications network according to an embodiment of the invention;

Figures 3a to 3e show methods of installing a wireless communications network according to differing embodiments of the invention; and

Figure 4a and 4b show in more detail features of a method of installing a wireless communications network according to the embodiment of the invention shown in Figure 3a.

The best mode of the invention will now be described with reference to the accompanying drawings. Those of ordinary skill in the art will be aware that the description of certain embodiments of the invention provided may omit details which are already well known in the art to implement certain features of the invention for the sake of clarity, and that where the description refers to a feature the reference implicitly also includes any functional equivalents or modifications already known in the art unless these are explicitly excluded.

Figure 2 of the accompanying drawings shows an exemplary scenario in which a user wishes to enable wireless connectivity between at least one client device 12 and a wireless access point 14. References to a wireless access point refer to any appropriate device configurable to provide a wireless network via which one or more other devices such as client terminals, printers and other wireless communications enabled computer peripherals are able to wirelessly communicate with each other and/or wirelessly access other communications networks. Accordingly, a wireless access point may comprise a computer modem and/or a wireless router.

Examples of client devices include computer platforms/apparatus (such as for example, desktop or mobile client terminals) or other devices such as, for example, gaming consoles, television apparatus, set-top boxes for television apparatus, other domestic household appliances, etc or any other device requiring wireless connectivity). Examples of access points include, for example, a wireless modem/router-type device such as the Home Hub marketed by British Telecommunications plc for the residential market, which enables one or a plurality of devices to form and use wireless communications links. The access point 14 may also be provided in a non-residential environment and offer wireless connectivity to non-residential environment-type client devices.

It is assumed that the access point 14 is preconfigured for onwards connection to a public communications network by a service provider, for example to a wired network such as the PSTN supported by British Telecommunications plc. In some embodiments, however, it may also or instead be configured to connect to another wired or wireless network. In some embodiments, it may be configured for onwards connectivity only after installation of the local area wireless network in accordance with the invention.

Also shown in Figure 2 is an installation device 16 according to an embodiment of the invention which provides portable storage of electronic data. In one embodiment of the invention, the installation device 16 comprises suitable hardware components and software components for configuring and enabling a client device to connect to a wireless network such as, for example, an antenna. However, the hardware components for wireless connectivity such as the antenna may be provided by the client device 12. In one embodiment, the installation device 16 comprises a wireless adapter pre-programmed with information corresponding to the access point 14 with which it is to have wireless connectivity. The installation device 16 in this embodiment further comprises a suitable antenna for detecting an available wireless network and appropriate control functionality, although as mentioned above in some embodiments hardware for implementing this functionality is instead provided using components hosted on the client device 12.

In the best mode of the invention, the installation device 12 further comprises a Universal Serial Bus type of connector for connection via a suitable port to the client device 12. The portable data store of the installation device 16 comprises a suitable read and writable non-volatile memory component for storing configuration information arranged to enable the client device 12 to connect to the wireless access point 12 over a wireless network provided by the wireless access point 14. Examples of suitable non-volatile memory components include flash memory or any other suitable form of read and writable memory component such as, for example, a Electrically Erasable Programmable Read-Only Memory component, or a micro-drive memory component.

The memory component has sufficient capacity to at least store configuration data comprising a network identifier and/or wireless encryption key and may optionally also store generic installation data and/or other information. As the network identifier and/or wireless encryption key are preferably unique per installation device, the memory is preferably of a form to which such unique data can be quickly and efficiently written to. The configuration data is either pre-installed in the memory component prior to being used for configuring the client device 12, in which case it is paired with equivalent configuration information stored by the access point 14, or, in some embodiments of the invention, the configuration information is dynamically generated during the installation process, in which case the installation device is used to configure both the client device 12 and the wireless access point 14 with the paired equivalent configuration information.

A method of installing a wireless network according to one embodiment of the invention requires generic installation software implementing an installation computer program to run on the client device 12 in order to configure the client device 12 to connect to the relevant access point. This generic installation software may, for example, be used to configure any antenna

and/or tuner components etc provided on the client device 12 and/or to configure one or more equivalent/complementary components on the installation device 16. If this generic installation code is not to be provided by the installation device itself, this information is assumed to be pre-provided on the client device 12, for example, by installing the code using
5 another carrier medium which the client device has access to, for example, via a CD-ROM or DVD or electronic download prior to attaching the installation device 16.

Figures 3a, 3b, 3b summarize various embodiments of a wireless method of installing a wireless communications network to enable wireless connectivity between a first client device
10 12 and the access point 14 using the installation device 16 as shown in Figure 2.

A first embodiment of the invention assumes the access point 14 is preconfigured with access point configuration information comprising at least a wireless network identifier and wireless encryption key. The access point configuration information is paired with equivalent client device configuration information provided on the installation device 16. The paired client
15 device information provides sufficient information to configure the client device 12 to have secure wireless connectivity with the configured access point 14. Examples of configuration information include information which uniquely identifies the access point 14 (such as an SSID for example) and an encryption key for data provided over wireless connections with the access point 14 (for example, such as a WEP or WAP key).

In Figure 3a, the client device 12 is first configured using the generic installation software described hereinabove. This generic installation software needs to be provided with additional information comprising the configuration information for the client device 12
20 corresponding to the configuration information of the wireless access point 14. The client configuration information, which is not generic and is preferably unique to the client device 12, enables the client device 12 to identify the wireless network which the access point 14 provides and enables the communications sent over the network to be appropriately encrypted and decrypted by the relevant one of the access point/client device. As previously described herein above, the generic installation software runs on the client device 12 and
25 either loads the paired configuration information from the installation device 16 at the appropriate point during execution of the installation program or, for example if the installation program itself is provided by the installation device, when the installation program is loaded and runs on the client device this can incorporate the necessary paired configuration information.

In either case, however, the installation proceeds without the user entering any configuration information and may, in the best mode of the invention, proceed in a fully automated manner without user input apart from directory tree and/or licence acceptance.

The installation device 16 (for example in the form of a wireless adapter) is connected to the client device 12 by a user (step 20 in Figure 3a) either prior to running the generic installation software (which is necessary if the installation device is to automatically load the generic installation software itself) or at one or more points prompted by the generic installation program. Once the installation device 16 is connected to the client device 12, the unique information required to form a wireless connection to the access point 14 is provided automatically to configure the client device 12 to be capable of forming a wireless connection with access point 14 (shown as step 21 in Figure 3a).

The client device 12 then searches for available wireless networks (step 22 in Figure 3a), and once a suitable wireless network has been located (for example, a network which meets one or more wireless network characteristic criteria such as quality of signal strength exceeding a threshold value or noise being less than a threshold value), the installation programme compares the information identifying the network with the information provided by the installation device 16. If this is a match, the correct network has been identified for that installation device 16, and the encryption keys will also be checked to confirm they match (step 23 in Figure 3a). Once the installation programme has confirmed that the client device 12 has the capability to for wireless connectivity to the access point 14, it attaches the client device 12 to the network provided by the access point 14 (step 24) and the client device will be ready for use.

In one embodiment the installation device 16 is first connected to the access point 14 and retrieves from the access point 14 the appropriate paired configuration information, for example, the same network identifier and encryption key. Once this information has been transferred to the installation device 16, the user is alerted using appropriate means provided either on the installation device 16 or the access point 14 that the information transfer is complete. The user then disconnects the installation device 16 from the access point 14 and connects the installation device 16 to the client device 12. The configuration of the client device then proceeds as per Figure 3a.

Figures 3b and 3c show embodiments of the invention in which the same installation device 16 is first used to configure the access point 14 before being used to configure the client device 12.

In Figure 3b, it is assumed that although access point 14 has power and can function as an access point, it has not yet been fully configured to provide secure network access. Accordingly, at the start of the network installation programme point the network generated by the access point is only available for configuration purposes and cannot be used securely by a client device 12.

In order to configure the access point 14 according to this embodiment of the invention, the client device 12 is connected first to the installation device 16 (step 20). The installation device has the features and components described previously in the context of Figure 3a.

- 5 In Figure 3b, the installation device 16 is preconfigured with suitable configuration information enabling the remote configuration of the access point 14 in addition to configuration information enabling configuration of the client device 12. The client device 12 then searches for a suitable candidate network for completing the network configuration (step 25).
- 10 If a network is determined to already have both a SSID and WEP key, for example, then the network is pre-configured and it is not considered as a candidate network for this embodiment of a wireless network installation method. One or more candidate networks may be detected during a network scan and, if so, the installation process will perform one or more checks in order to ensure the correct network is selected, that is to say, to ensure the client device 12
- 15 select the correct network corresponding to the network provided by the access point 14 that that particular client device 12 is to attach to.

- Suitable checking processes could require the candidate network which meet one or more network characteristic criteria, for example, signal strength and/or QoS etc. Once a network
- 20 available for configuration has been located, the network access point 14 is provided with configuration information by transmitting this from the client device (step 26). To implement this, a suitable protocol governing the detection by the access point 14 of the client device 12b is implemented to enable the information to be provided from the wireless adaptor 16 to configure the access point 14 which can be implemented using any suitable process known in
- 25 those of ordinary skill in the art.

- Once the network has been configured with the relevant configuration information provided by the installation device 16, the installation device 16 remains attached to the client device 12 and is used to configure the client device 12 to use the configured network offered by the
- 30 access point 14 in the manner described in Figure 3a.

- Figure 3c shows another embodiment. In Figure 3c, instead of the installation device 16 being first attached to the client device 12 and remaining attached during both the remote configuration of the access point 14 and the subsequent configuration of the client device as
- 35 in Figure 3b, the installation device 16 is instead first connected to the access point 14 either directly or via a suitable adaptor (not shown) (step 17).

- In this embodiment, the access point 14 is configured (step 19) using information that the installation device 16 provides to ensure that the information identifying the wireless network
- 40 and the encryption key is suitably paired with that which will be later used to configure the

client device 12. An alert may be provided to indicate to a user when the installation process has completed either in the form of a suitable display or sound on the installation device or on the access point 14 and/or a suitable release device or button may be provided. Once the access point 14 has been suitably configured, the installation device 16 is disconnected from the access point (step 29) and is then connected to the client device 12 (step 20). The configuration of the client device 12 then follows the remaining steps for installation shown in Figure 3a.

Figures 3d and 3e of the accompanying drawings each show an embodiment of the invention in which a method of installing a wireless communications network uses configuration information dynamically generated, either programmatically and/or via user input. In Figure 3d, the configuration information is first generated on the client device 12 and the installation device stores this information and provides it to the access point 14. In Figure 3e, the configuration information is first generated on the access point 14 and then stored on the installation device which is then used to provide the corresponding configuration information to the client device 12.

Returning first to Figure 3d, the client device 12 runs installation software (60) which dynamically generates configuration information for the client device 12 and the access point 14 (step 62) during the installation process which is then transferred to the installation device 16 at some point. This information may be generated using any appropriate technique known in the art as suitable for generating random or pseudo random information to preferably ensure each client device generates unique configuration information for at least the wireless encryption key and/or a wireless network identifier. This information is then used to generate paired configuration information for the access point 14.

The client device 12 then searches for a suitable candidate network for completing the network configuration (step 64). If a network is determined to already have both a SSID and WEP key, for example, then the network is pre-configured and it is not considered as a candidate network for this embodiment of a wireless network installation method. One or more candidate networks may be detected during a network scan and, if so, the installation process will perform one or more checks in order to ensure the correct network is selected, that is to say, to ensure the client device 12 selects the correct network corresponding to the network provided by the access point 14 that that particular client device 12 is to attach to.

Suitable checking processes could require the candidate network which meet one or more network characteristic criteria, for example, signal strength and/or QoS etc. Once a network available for configuration has been located, the network access point 14 is provided with configuration information by transmitting this from the client device 12 using a suitable protocol to govern the installation by the access point 14 of the configuration instructions

provided by client device 12. The client device 12 is then also configured to attach to the network using the settings which were generated by the installation process (step 70). At some appropriate point, shown as the final step in Figure 3d, the installation device 16 will store the dynamically generated configuration information to enable other client devices to be
5 attached to the wireless network offered by the access point 14 using the same configuration settings, i.e., for example, using the same wireless network identifier and encryption key information.

Once the corresponding information has been written to the installation device 16 by the
10 installation software, the installation device 16 may instead be disconnected from the client device 12 and connected to the access point 14 either directly and/or via a suitable adaptor, and the configuration information transferred to the access point 14 directly.

Figure 3e shows a variation to the process shown previously in Figure 3c where the
15 installation configuration information is not stored on the installation device initially, but is instead generated dynamically during the installation process. In Figure 3e, the installation device is connected to the access point 14 (step 80) and either overrides any existing settings or triggers the automatic execution of an initialization program which dynamically generates appropriate configuration information for the access point (step 82). The dynamically
20 generated settings are then stored on the access point 14 (step 84) and used to configure the access point appropriately (84). Corresponding configuration information for a client device is then stored on the installation device 16 (step 88), and the installation device is then disconnected from the access point 14 and connected to the client device 12 (step 90). At this point the client device runs its installation software utilising the configuration information
25 provided by the installation device along the manner shown in Figure 3a in order to configure itself to have wireless connectivity to access point 14 (step 92).

In one embodiment, the installation software running on the client device 12 stores the configuration information for itself and other client devices and/or the access point to the
30 memory of the installation device 16 to enable subsequent installations to be completed for other client devices to have wireless connectivity to the same access point 14 and/or to enable the access point to be reconfigured in the event it requires such a step.

An embodiment of a method of installing a wireless network will now be described in more
35 detail with reference to Figure 4a of the accompanying drawings.

The method starts by requiring the installation software to be installed on the relevant client device (step 30). As mentioned hereinabove, this could be achieved by loading a CD-ROM, DVD or other type of non-volatile memory device providing a carrier medium for the

installation software or as a software download and/or be loaded using the installation device 16 itself.

As soon as the software is installed, it is configured to find out the status of the hardware required to form a wireless connection with the remote access point 14. The hardware may be provided either on the installation device 16 or on the client device 12. The installation process then checks that the installation device 16 is connected to client device 12 (step 38) and that it is powered (step 36) and functioning (step 38), i.e. that the installation device 16 is able to detect a wireless network.

The method of wirelessly installing a wireless network continues now in Figure 4b of the accompanying drawings. At this point, the installation device 16 has no knowledge of its environment and so conducts a scan for available wireless networks (step 40). If the installation device 16 detects one or more wireless networks (step 42), the installation process then confirms that the client device 12 has loaded the appropriate paired configuration information to connect to a specific network, for example, as shown in Figure 4b, the process checks that the client device 12 has a wireless network identifier and an encryption key such as WEP and a SSID type network identifier. If for some reason these were not available, then in one embodiment of the invention, the installation program reverts back to requesting manual input from a user for missing information (not shown) or reinsertion of the installation device 16 into the client device 12.

Assuming the installation program finds the paired configuration information on the installation device 16 or already on the client device 12, it checks if any detected networks have corresponding configuration information so that the correct network for the client device 12 to attach to can be identified (step 46). Once such the correct network has been located, the client device is configured to have the correct wireless connectivity information using the encryption key (step 48). The client device 12 then connects to the identified network (step 50) and confirms the encryption key it has is correct for that network (step 52). The client device 12 then stores the relevant settings for wireless connectivity with the access point 14 (step 54) so that the client device 12 is able to reattach to the same wireless network access point after a sleep or reboot. In this manner, the information provided by the installation device 16 is paired on the client device 12 to match that provided on the wireless access point 14.

The above embodiments of the invention provide a method of installing and/or configuring a wireless communications system using a portable memory device.

The portable memory device comprises non-volatile computer memory that can be programmed uniquely with unique additional data to provide wireless encryption as well as

generic data which enables a wireless communications system to be installed and configured. The non-volatile memory is preferably flash memory which is provided in the form of a USB device or memory card, which is a form of Electronically Erasable Programmable Read-Only Memory (EEPROM), although the latter is erasable in small blocks (typically bytes), whereas
5 flash memory is programmable in larger blocks.

Those of ordinary skill in the art will be aware that the configuration of the client device 12 may precede that of the access point 14 in appropriate embodiments of the invention.

10 Those of ordinary skill in the art will be further aware that where the description refers to a process capable of being implemented using software, the description is also intended to include other means of executing the same instruction sets as the software, for example, in hardware, and/or firmware and/or any combination thereof known in the art as appropriate for the purposes of implementing the invention.

15 Exemplary embodiments of the invention were described in detail herein above and pictorially in the accompanying drawings, however, the invention is not intended to be limited to exemplary embodiments but includes various obvious modifications and equivalent arrangements, which fall within the purview of the appended claims. Features referred to
20 explicitly herein and in the claims may be replaced with alternative features providing functional equivalents where such functional equivalents would be known to those of ordinary skill in the art.

In the above description, references to "one embodiment," "an embodiment," "example
25 embodiment," "various embodiments," "alternative embodiment(s)" etc., indicate that the embodiment(s) of the invention so described include a particular feature, structure, or characteristic. However, it is not necessary for every embodiment to comprise that particular feature, structure, or characteristic. Where reference is made to one embodiment or an exemplary embodiment or to another embodiment or to alternative embodiment(s) or the like
30 phrase herein it may or may not refer to one or more of the features described in one or more other embodiments as would be apparent to one of ordinary skill in the art.

Where appropriate, terms referring to features such as, for example, "processing," "computing," "calculating," "determining," or the like refer to an action and/or process(es)
35 undertaken by a computer or computing system, or similar electronic computing device, that manipulate and/or transform data represented as physical, such as electronic, quantities within the computing system's registers and/or memories into other data similarly represented as physical quantities within the computing system's memories, registers or other such information storage, transmission or display devices.

40

The term "wireless network node" referred to herein refers to any device capable of providing or connecting to a wireless network when suitably configured, and includes references to a wireless network access point, client device/terminal, or any other device capable of wireless communications over a wireless network when suitable configured such as a printer or other type of computer peripheral, portable or desktop computer, mobile communications device including a suitably processor enabled mobile telephone type device.

The term "client terminal" is used herein synonymously with the term "client device" to refer to any suitably configured computer platform, which may be wireless communications enabled independently of any connection (which includes attachment) of the installation device to the client terminal or wireless communications enabled through the connection of the installation device in those embodiments where the installation device includes appropriate wireless communications means such as, for example, suitably configured antenna means and transceiver means such as are known in the art.

A suitably configured "computing platform" comprises one or more data processors, where a data "processor" refers to any device or portion of a device that processes electronic data from registers and/or memory to transform that electronic data into other electronic data that is capable of being stored in registers and/or memory.

Where one or more embodiments of the invention include apparatuses for performing the operations of the methods described here herein. An apparatus may be specially constructed for the desired purposes, or it may comprise a general purpose device selectively activated or reconfigured by a program stored in the device. One or more embodiments of the methods according to the invention are implemented as instructions stored on a machine-readable medium, which may be read and executed by a computing platform to perform the operations described herein. The term "machine-readable medium" comprises any mechanism for storing or transmitting information in a form readable by a machine (e.g., a computer). Examples of machine-readable mediums include, but are not limited to : read only memory (ROM), random access memory (RAM), magnetic disk storage media, optical storage media, flash memory devices, and propagated electrical, optical, acoustical or other suitable digital and/or analogue signals (for example, carrier waves, infrared signals, digital signals, etc).

References to the term "computer program" and/or "computer control logic" include as appropriate references to machine code and/or executable code and/or source code which when compiled results in execution on a computing platform of the computer program.

A computer program may be provided in an electronically downloadable format or in a format which is stored in the main memory and/or secondary memory of a computing platform and/or data storage means capable of being attached and removed from a computing platform, for

example, the wireless network installation device. Where the wireless network installation computer program is stored in such data storage means it comprises a computer program product. Such computer programs, when executed, are arranged to enable the client terminal, i.e., a computer platform or system, to perform the features of the present invention as discussed herein. In particular, the computer programs, when executed, are arranged to enable a processor to implement one or more steps in a method according to an embodiment of the invention. Accordingly, such computer programs may represent data controllers of the computer system.

10 Another embodiment of the invention comprises a computer program product comprising a computer readable medium having control logic (computer software) stored therein. The control logic, when executed by a processor causes the processor to perform the functions of an embodiment of the invention as described herein.

15 In another exemplary embodiment of the invention implemented using software, the software is stored in a computer program product and loaded into a computer system using said data storage means and/or a hard drive and/or via a network communications interface card. Software implementing control logic executed by a data processor causes the processor to perform the functions of an embodiment of the invention as described herein.

20 The embodiments and examples discussed herein are non-limiting examples. The embodiments of the invention described in detail herein above form exemplary embodiments only and it will be apparent to those skilled in the art that changes and modifications may be made without departing from the spirit and scope of the invention, for example, in its broader aspects. The embodiments of the invention as defined in the claims are intended to cover all such changes and modifications as fall within the true spirit of the invention.

25

CLAIMS:

1. A method of installing a wireless communications network comprising:
 - configuring a first network node with wireless network configuration settings,
 - 5 wherein said settings are generated automatically and dynamically during the network configuration of said first network node;
 - connecting a portable data store to said first network node and storing thereon said wireless network configuration settings;
 - subsequently connecting said portable data store to another network node to
 - 10 automatically configure said other network node with said wireless network configuration settings,
 - wherein at least one of said first network node and said other network node comprises a wireless communications network access point, and
 - wherein at least one of said first network node and said other network node
 - 15 comprises a client terminal,
 - whereby said wireless communications network access point is automatically configured to provide said wireless communications network and said client terminal is automatically configured to have access to said wireless communications network.
- 20 2. A method as claimed in claim 1, wherein at least one said wireless network configuration settings comprises a wireless communications network security key.
3. A method as claimed in claim 1 or 2, wherein at least one said wireless network configuration settings comprises a wireless communications network identifier.
- 25 4. A method of configuring a wireless communications network access point, the method comprising:
 - triggering the automatic generation on the access point of wireless network configuration information, wherein said automatically generated configuration information
 - 30 comprises at least a wireless network identifier for identifying network traffic as belonging to the wireless network provided by the access point; and
 - configuring the access point using said automatically generated configuration information to provide a wireless network.
- 35 5. A method as claimed in claim 4, further comprising:
 - connecting an installation device capable of connecting to a client device, the installation device comprising portable data storage means, to the access point; and
 - storing on said installation device in said storage means corresponding wireless network configuration information capable of enabling said client device to have wireless

connectivity with said access point when said installation device subsequently connects to said client device.

5 6. A method as claimed in claim 5, wherein the connection of the installation device triggers the automatic generation of the configuration information.

7. A method as claimed in claim 4 or 5, wherein the automatic generation of said configuration information is triggered manually.

10 8. A method as claimed in any previous claim, wherein the configuration information replaces previous configuration information stored on said access point.

15 9. A method as claimed any one of previous claims 5 to 8, wherein said installation device is arranged to disconnect from the access point and instead connect to a client device and is arranged to provide said stored corresponding configuration information to said client device to enable the client device to connect to a wireless network provided by said access point.

20 10. The method as claimed in any previous claim, wherein said configuration information further comprises a wireless communications encryption key, generated programmatically on the access point using a pseudo-random process.

25 11. An installation device comprising:
a portable electronic data storage means; and
a connector providing an electronic data interface for connecting to a network node,
and configured for use in implementing one or more appropriate steps in the method according any one of claims 1 to 10.

30 12. A wireless communications network access point comprising:
means to provide a wireless communications network;
means to trigger the generation of automatic wireless communications network configuration information;
means to connect to a portable data storage device;
means to transfer said automatically generated wireless network configuration
35 information to said portable data storage device.

40 13. A wireless network access point as claimed in claim 12, further comprising one or more transmission control components and/or data processors collectively arranged to:
respond to said triggering means to initiate the automatically generation on the access point of wireless network configuration information, wherein said automatically

generated configuration information comprises at least a wireless network identifier for identifying network traffic as belonging to the wireless network provided by the access point; and

5 configure the access point using said automatically generated configuration information to provide a wireless network.

14. A wireless network configured using the method as claimed in any one of claims 1 to 10.

10 15. A method of installing a wireless communications network by configuring a client device to have wireless connectivity with a wireless network access point, the method comprising:

15 automatically generating on the client device wireless network configuration information during the installation of said wireless network, wherein said automatically generated configuration information comprises at least an encryption key for encrypting wireless transmissions between the client device and the access point;

 configuring the client device using said configuration information;

 storing corresponding configuration information on an installation device comprising data storage means and connected to the client device;

20 detaching said installation device from said client device and attaching said installation device to said access point;

 providing said wireless network configuration information stored on said installation device to the access point, whereby said corresponding configuration information is automatically used by said access point to configure a wireless network provided by the
25 access point.

16. A method as claimed in claim 15, wherein the wireless network configuration information is generated programmatically on the client device using a pseudo-random process during the dynamic execution of generic wireless network installation software on the
30 client device.

17. A method as claimed in claim 15 or 16, wherein the configuration information is provided to the access point by the client device transmitting the information to the access point, wherein the wireless network provided by the access point uses a wireless network identifier which matches a corresponding wireless network identifier provided by said
35 installation device to the client device.

18. A method as claimed in one of claims 15 or 16, wherein the configuration information for the access point is provided by disconnecting the installation device from the client device
40 and reconnecting the installation device to the access point.

19. A method as claimed in claim 18, wherein the configuration information further comprises a wireless network identifier generated programmatically in an automated manner on the client device.

5

20. An installation device for installing a wireless network using a wireless network access point and at least one client terminal, the installation device comprising:

data storage means; and

a connector for connecting to said client terminal,

10

wherein said data storage means comprises non-volatile memory arranged to store information enabling the installation of a wireless communications network according to any one of claims 15 to 19, wherein said wireless network configuration information is derived from wireless network configuration information automatically generated on said client device and comprises at least an encryption key for encrypting wireless transmissions over a

15

wireless network which is stored on the installation device in a form capable of being subsequently used by said wireless network access point to configure its wireless network to a form which said client device is capable of automatically attaching to.

21. An installation device as claimed in claim 20, wherein said connector is arranged to connect to said client device to enable wireless network configuration information to be written to said memory by said client device.

20

22. A wireless communications network access point comprising:

means to connect to an installation device as claimed in either claim 19 or 20; and

a data interface arranged to receive the wireless configuration information from said installation device.

25

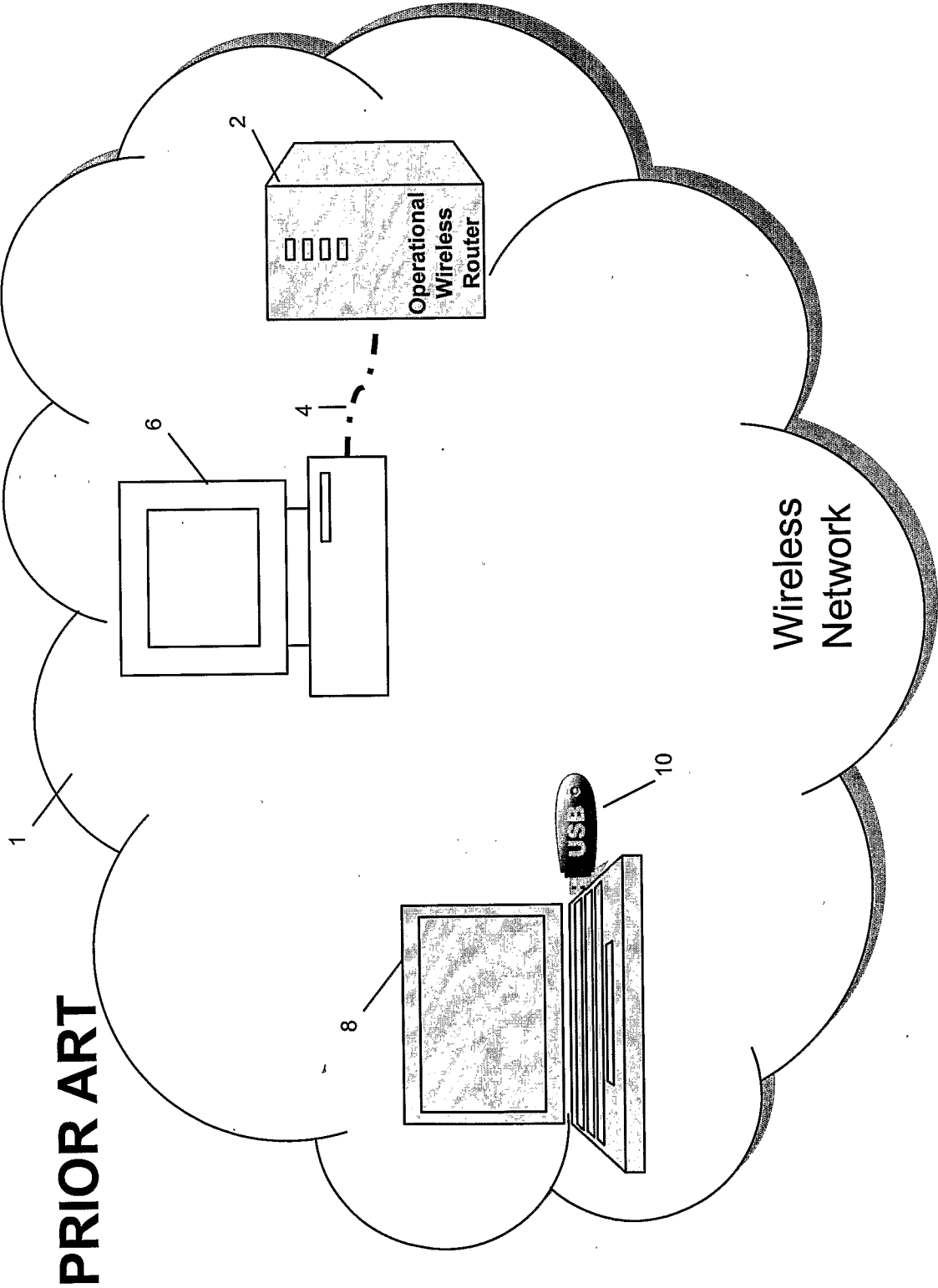


FIGURE 1

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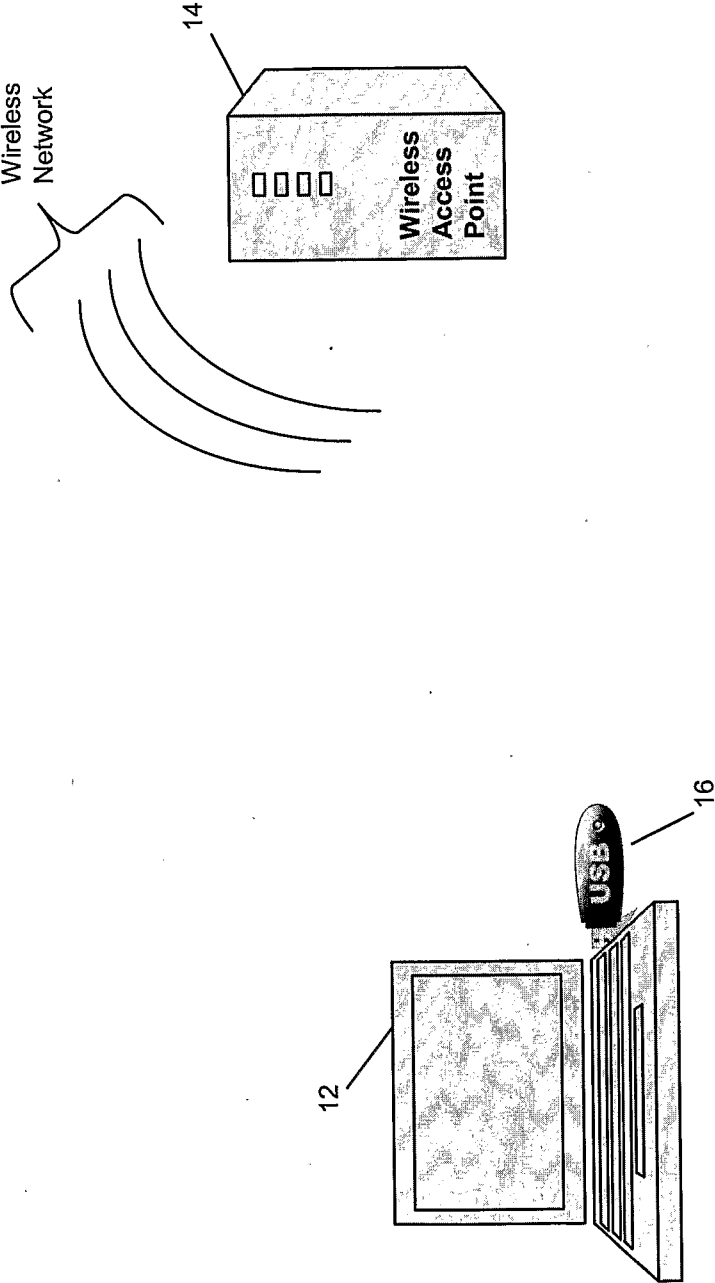


FIGURE 2

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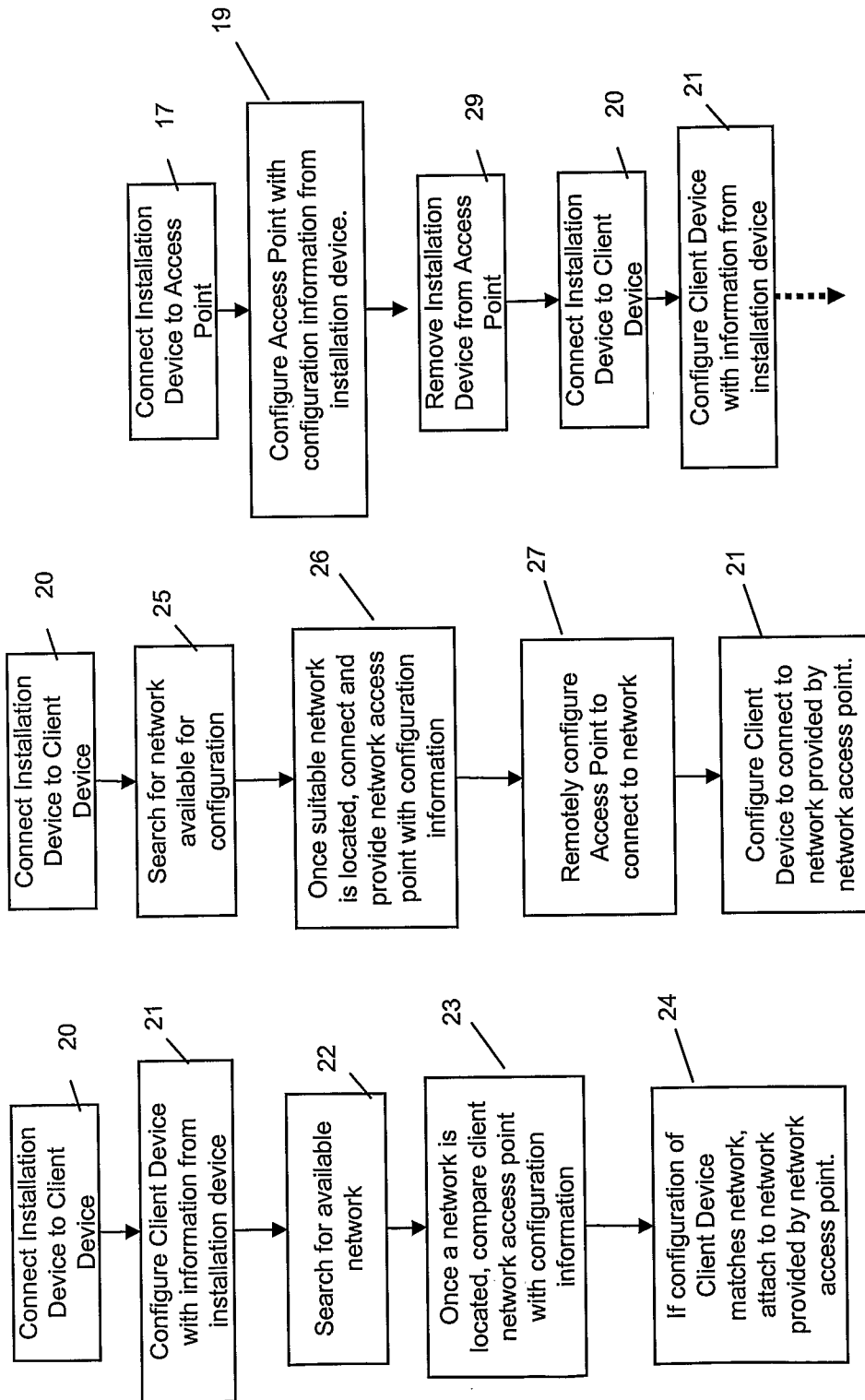


FIGURE 3c

FIGURE 3b

FIGURE 3a

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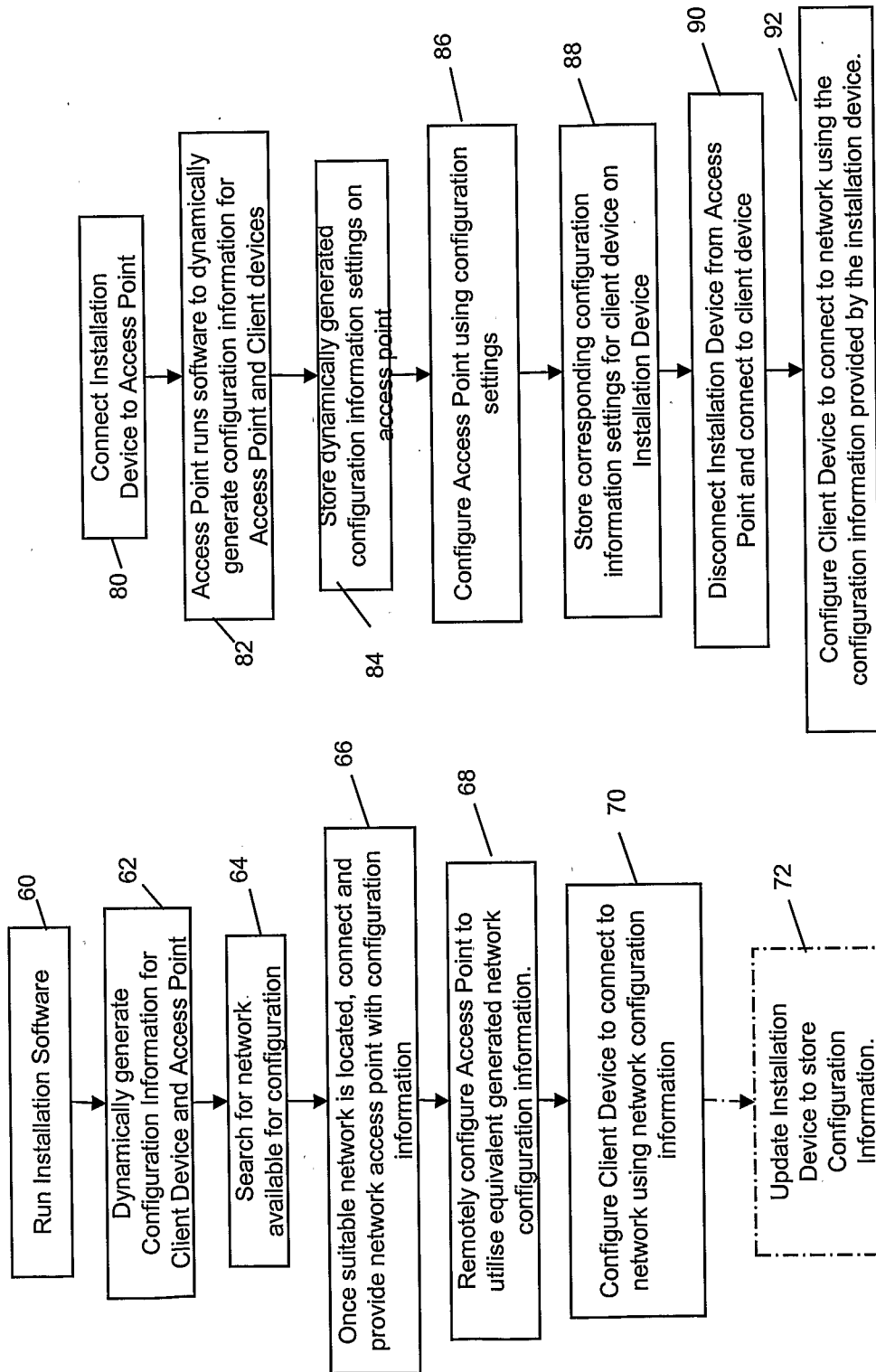


FIGURE 3e

FIGURE 3d

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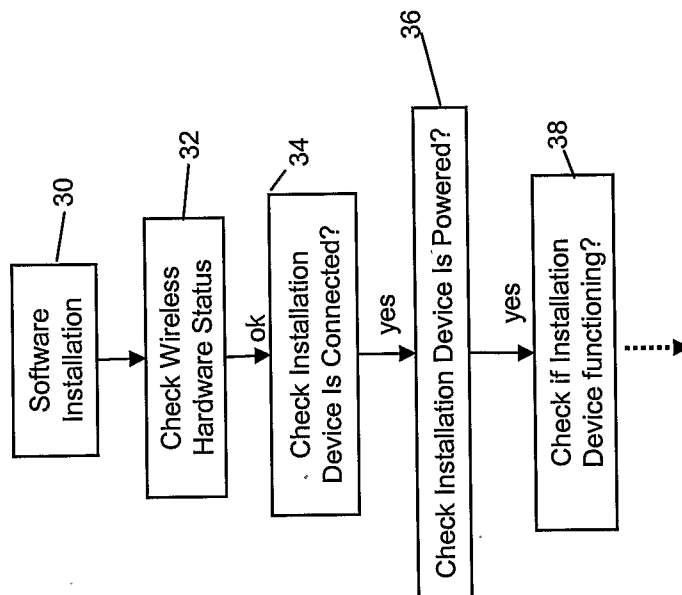
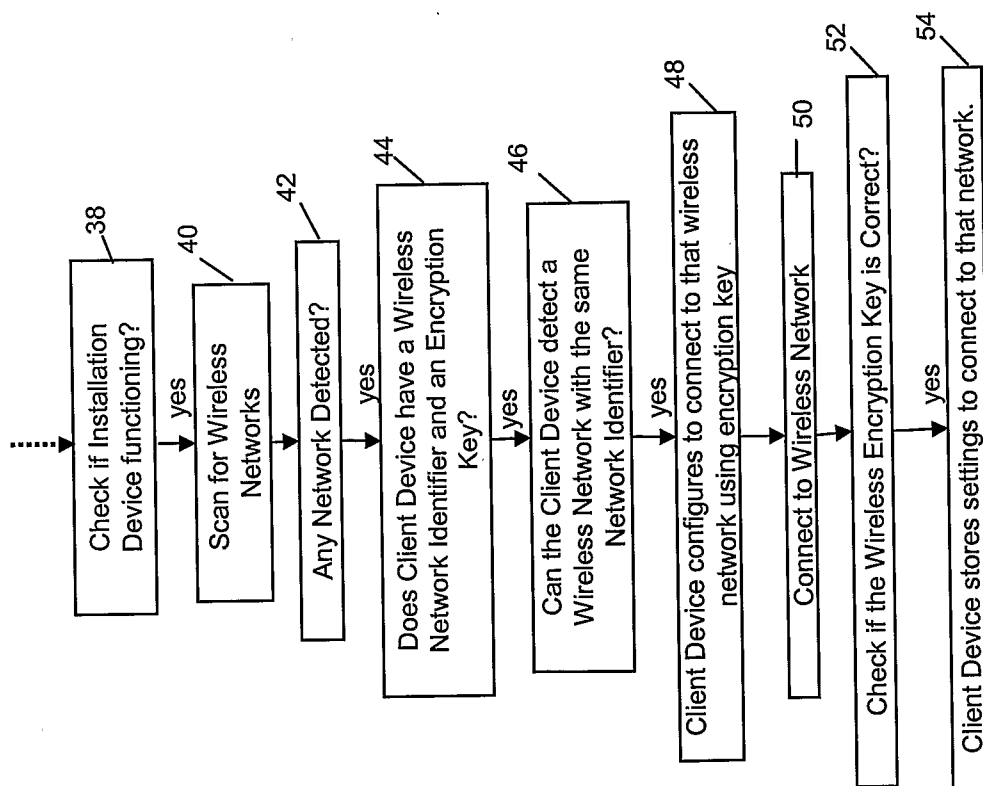


FIGURE 4A

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FIGURE 4B



INTERNATIONAL SEARCH REPORT

International application No
PCT/GB2009/000830

A. CLASSIFICATION OF SUBJECT MATTER

INV. H04W12/04 H04W28/18

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 practical, search terms used)

EPO-Internal, COMPENDEX, INSPEC, WPI Data

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X	EP 1 450 513 A1 (SONY CORP [JP]) 25 August 2004 (2004-08-25) figures 1,4,5,7 paragraph [0009] - paragraph [0031] paragraph [0048] - paragraph [0058] paragraph [0067] - paragraph [0069] paragraph [0075] - paragraph [0080]	1-22
X	WO 2005/029812 A1 (KONINKL PHILIPS ELECTRONICS NV [NL]; LI LI [CN]; WU KEYI [CN]; LI WEI) 31 March 2005 (2005-03-31) page 5, line 4 - page 6, line 5 page 7, line 7 - page 14, line 12	1-22
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☒ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

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Date of the actual completion of the international search

1 July 2009

Date of mailing of the international search report

08/07/2009

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INTERNATIONAL SEARCH REPORT

International application No
PCT/GB2009/000830

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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INTERNATIONAL SEARCH REPORT

information on patent family members

International application No

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