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Ishikawa

(54) **INFORMATION PROCESSING APPARATUS CAPABLE OF EASILY CONFIGURING SETTING ON INFRASTRUCTURE TO BE USED, CONTROL METHOD THEREFOR, AND STORAGE MEDIUM**

(71) Applicant: **CANON KABUSHIKI KAISHA**, Tokyo (JP)

(72) Inventor: **Akira Ishikawa**, Kawasaki-shi (JP)

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(57) **ABSTRACT**

An information processing apparatus in which a user is able to intuitively configure setting on an interface to be used. An interface to be enabled in the information processing apparatus is set in accordance with an instruction by a user. Statuses of a wired interface and a wireless interface are sets as any one of followings: enabling the wired interface without enabling a wireless interface, enabling the wireless interface without enabling the wired interface, and enabling both the wired interface and the wireless interface is set. An error corresponding to the setting is notified.

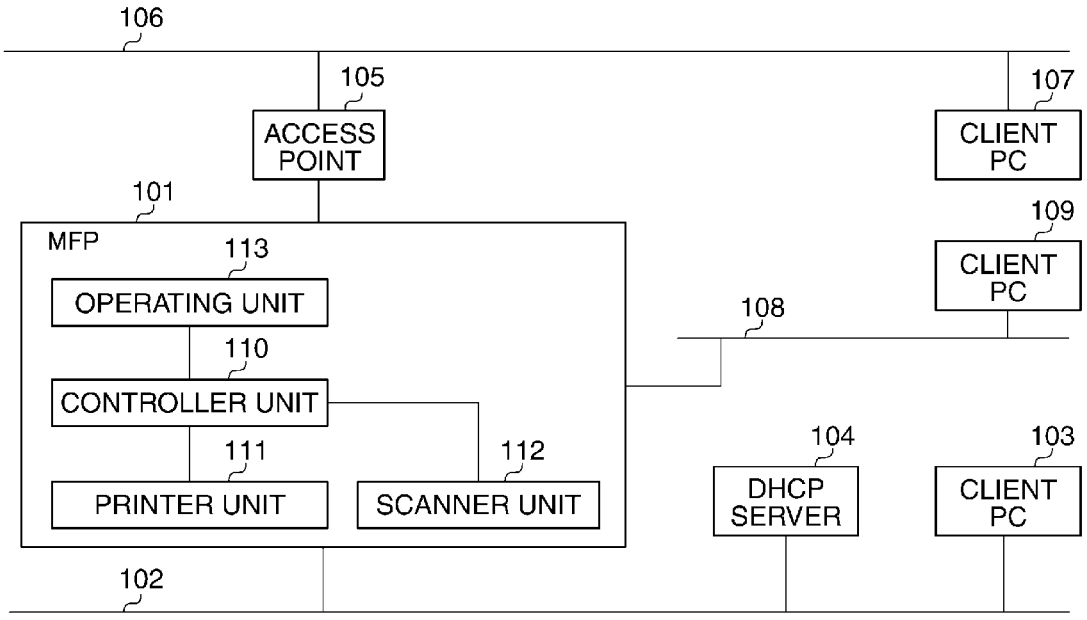


FIG. 1

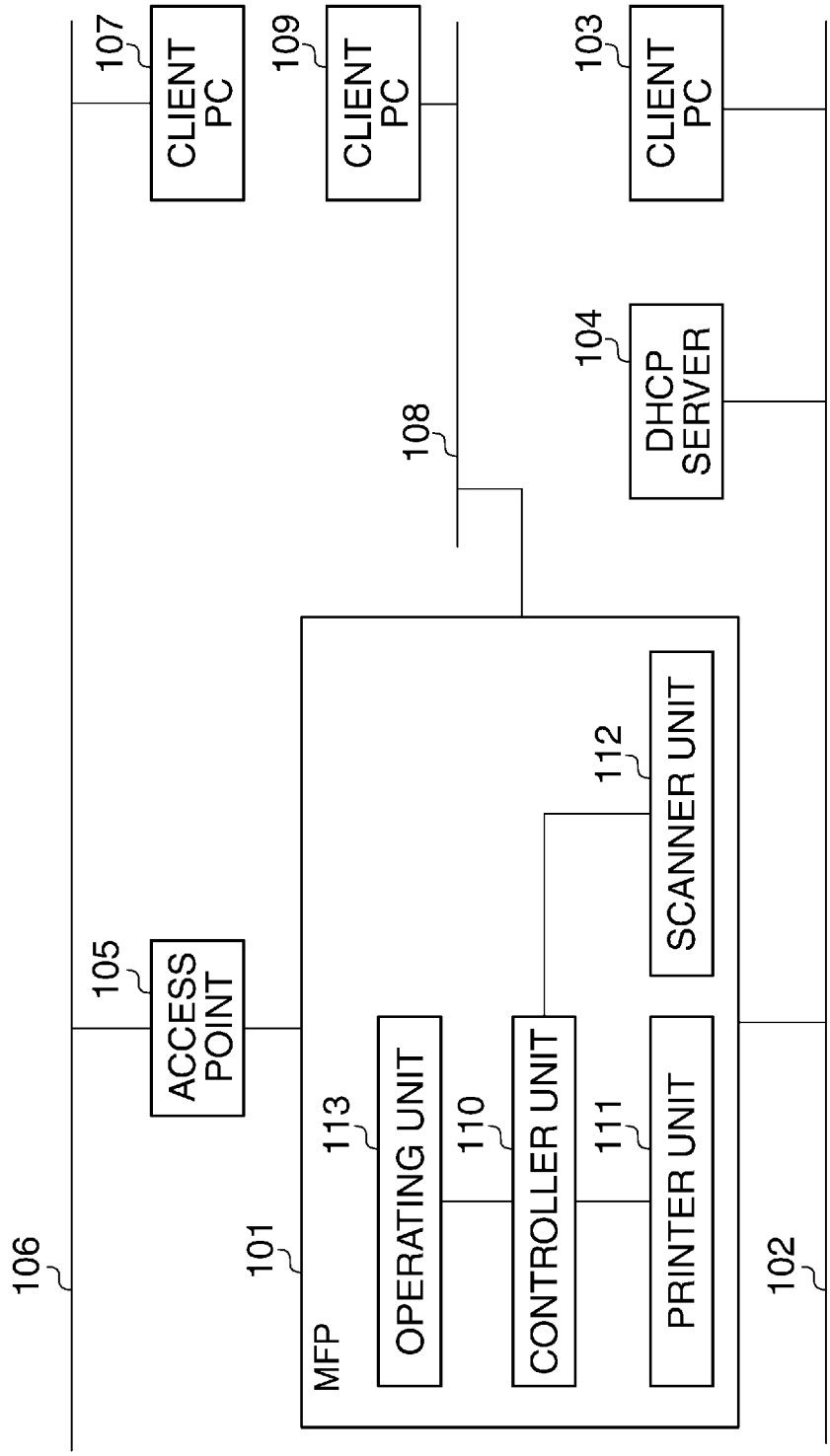

106
107
CLIENT PC
109
CLIENT PC
103
CLIENT PC
104
DHCP SERVER
108
105
ACCESS POINT
101
MFP
113
OPERATING UNIT
110
CONTROLLER UNIT
112
SCANNER UNIT
111
PRINTER UNIT
102

FIG. 2

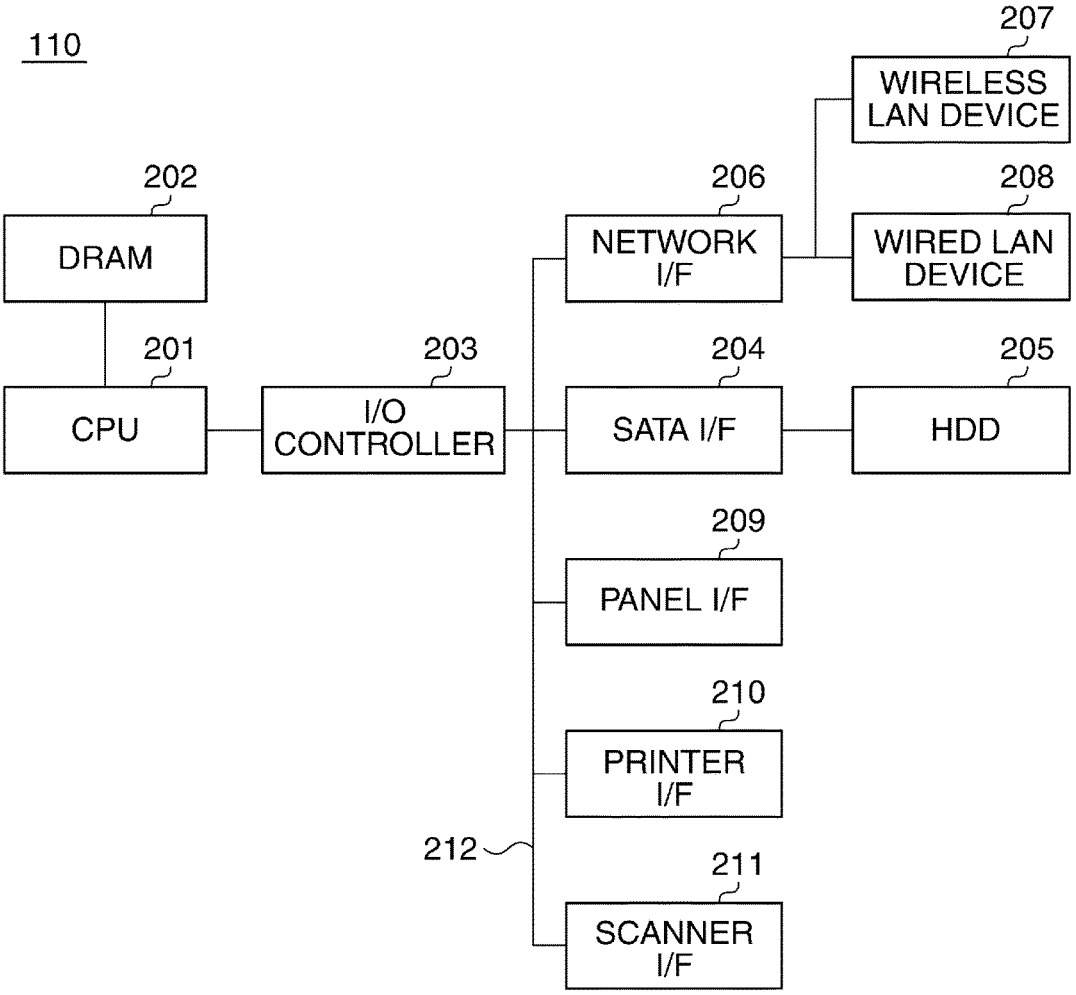

110
207
WIRELESS LAN DEVICE
202
206
208
DRAM
NETWORK I/F
WIRED LAN DEVICE
201
203
204
205
CPU
I/O CONTROLLER
SATA I/F
HDD
209
PANEL I/F
210
PRINTER I/F
212
211
SCANNER I/F

FIG. 3

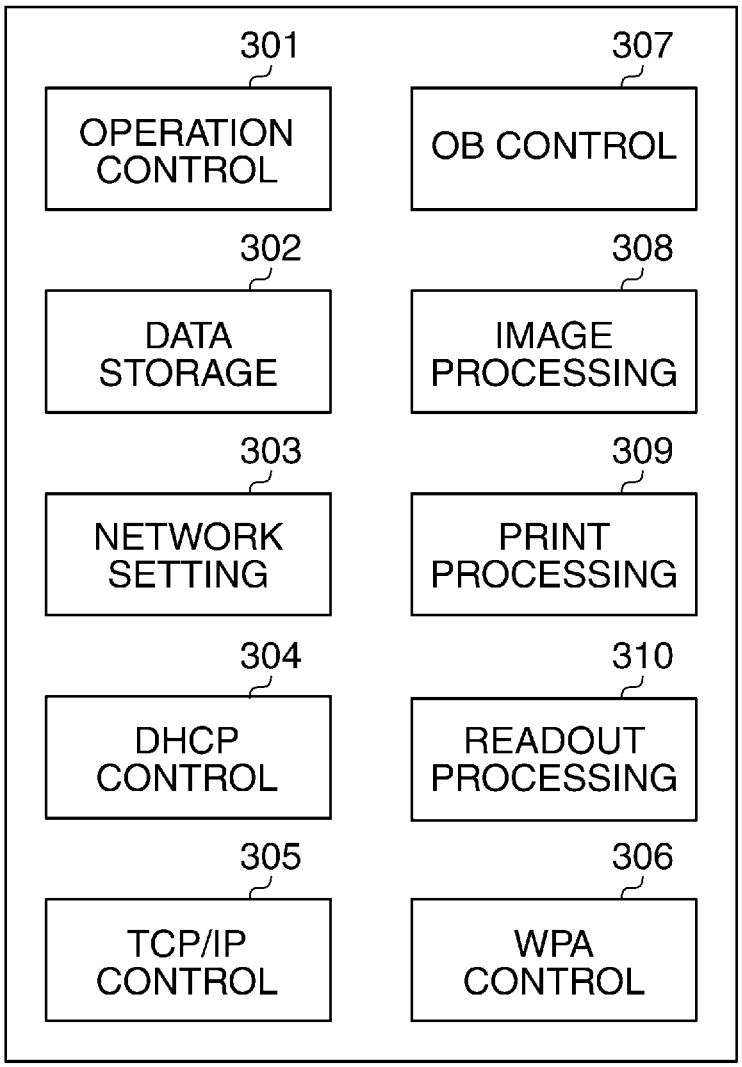

301
OPERATION CONTROL
307
OB CONTROL
302
DATA STORAGE
308
IMAGE PROCESSING
303
NETWORK SETTING
309
PRINT PROCESSING
304
DHCP CONTROL
310
READOUT PROCESSING
305
TCP/IP CONTROL
306
WPA CONTROL

FIG. 4

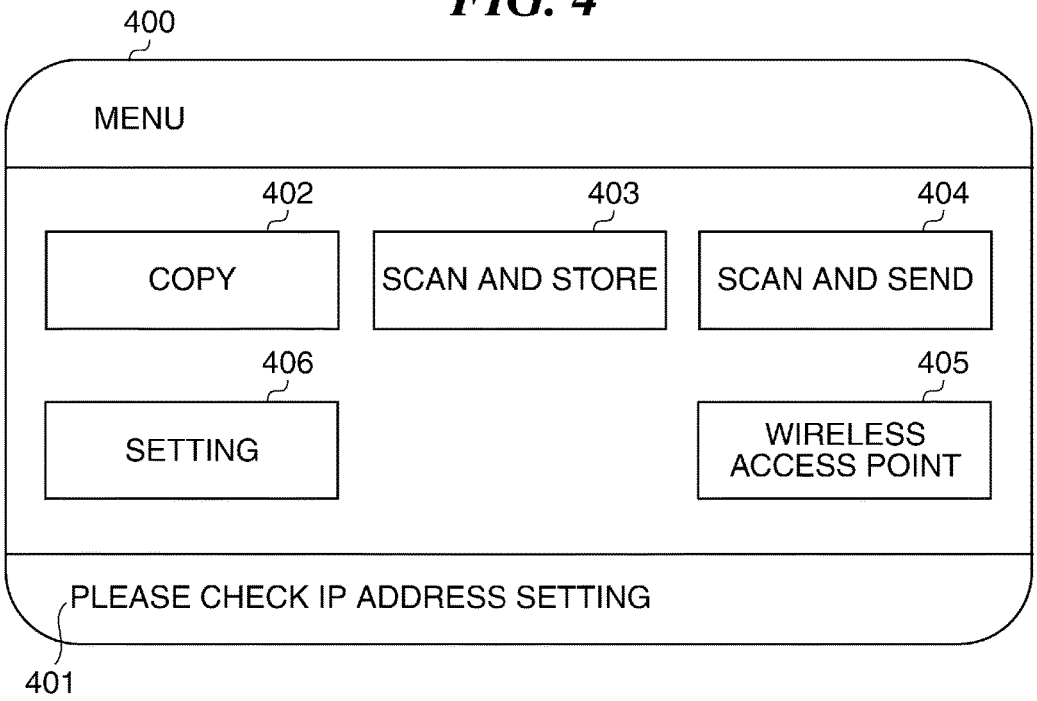

400
MENU
402
403
404
COPY
SCAN AND STORE
SCAN AND SEND
406
405
SETTING
WIRELESS ACCESS POINT
PLEASE CHECK IP ADDRESS SETTING
401

FIG. 5A

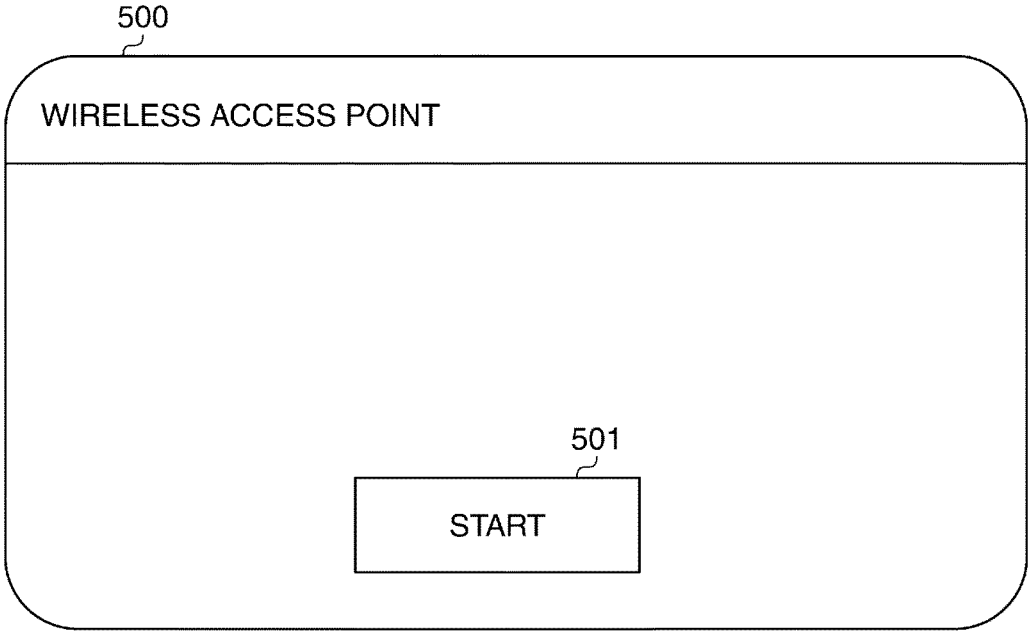

500
WIRELESS ACCESS POINT
501
START

FIG. 5B

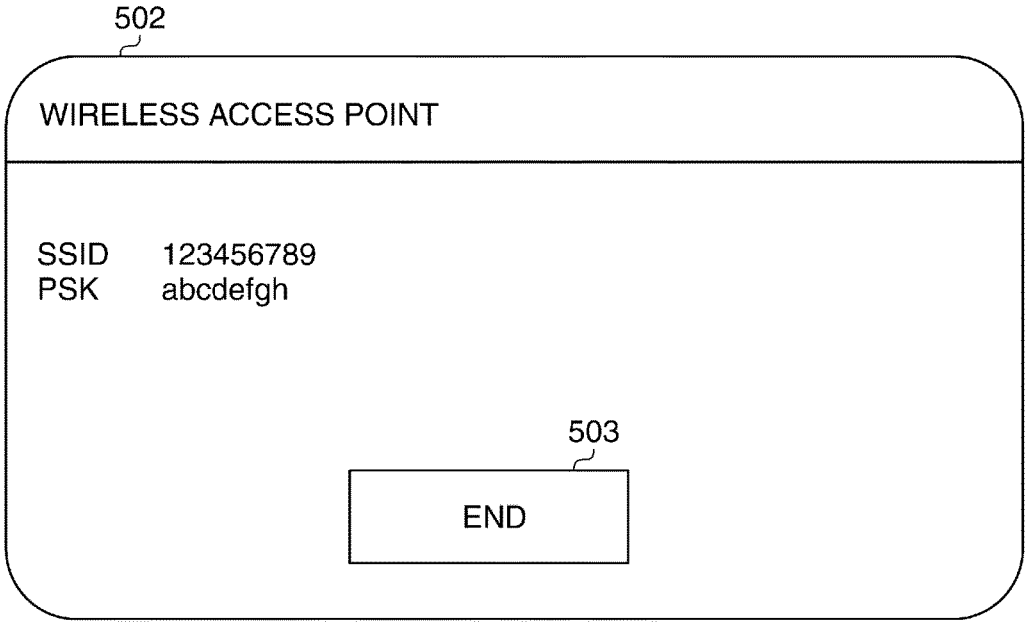

502
WIRELESS ACCESS POINT
SSID 123456789
PSK abcdefgh
503
END

FIG. 6

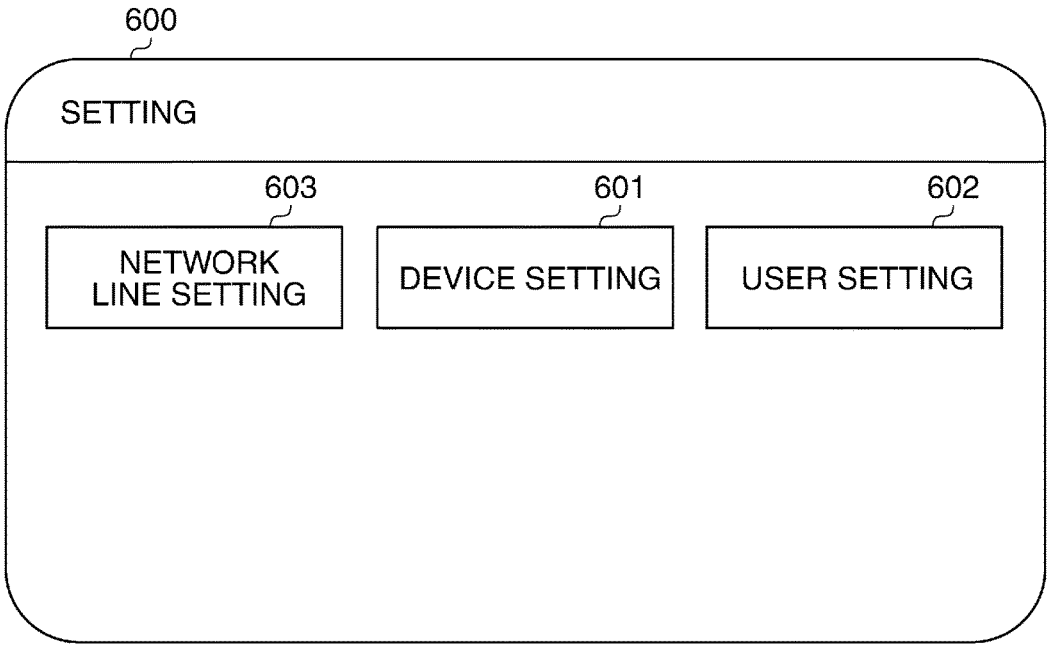

600
SETTING
603
NETWORK LINE SETTING
601
DEVICE SETTING
602
USER SETTING

FIG. 7

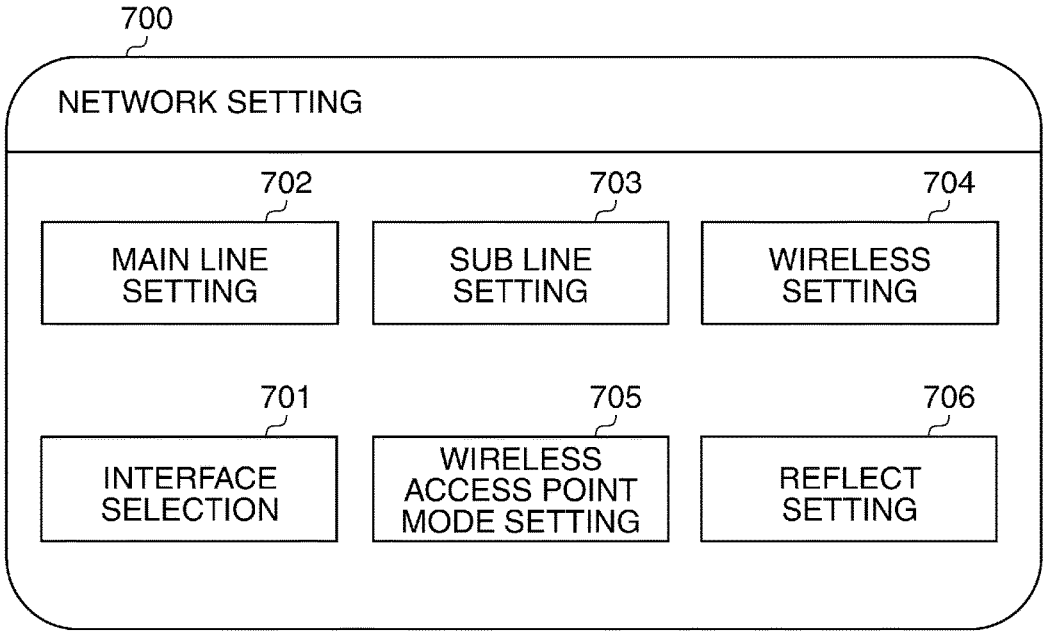

700
NETWORK SETTING
702
MAIN LINE SETTING
703
SUB LINE SETTING
704
WIRELESS SETTING
701
INTERFACE SELECTION
705
WIRELESS ACCESS POINT MODE SETTING
706
REFLECT SETTING

FIG. 8

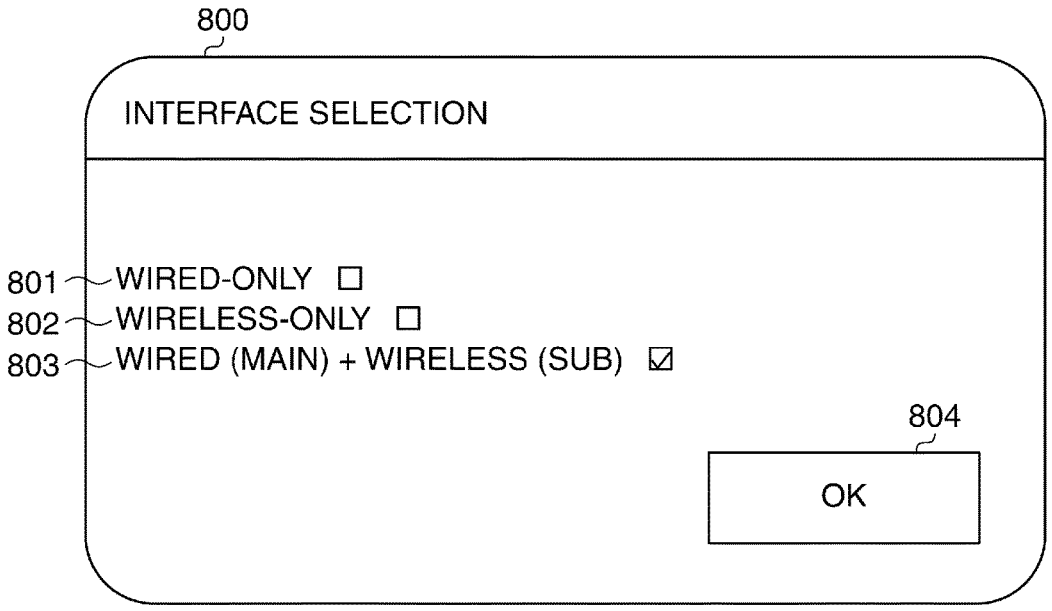

800
INTERFACE SELECTION
801
WIRED-ONLY ☐
802
WIRELESS-ONLY ☐
803
WIRED (MAIN) + WIRELESS (SUB) ☑
804
OK

FIG. 9

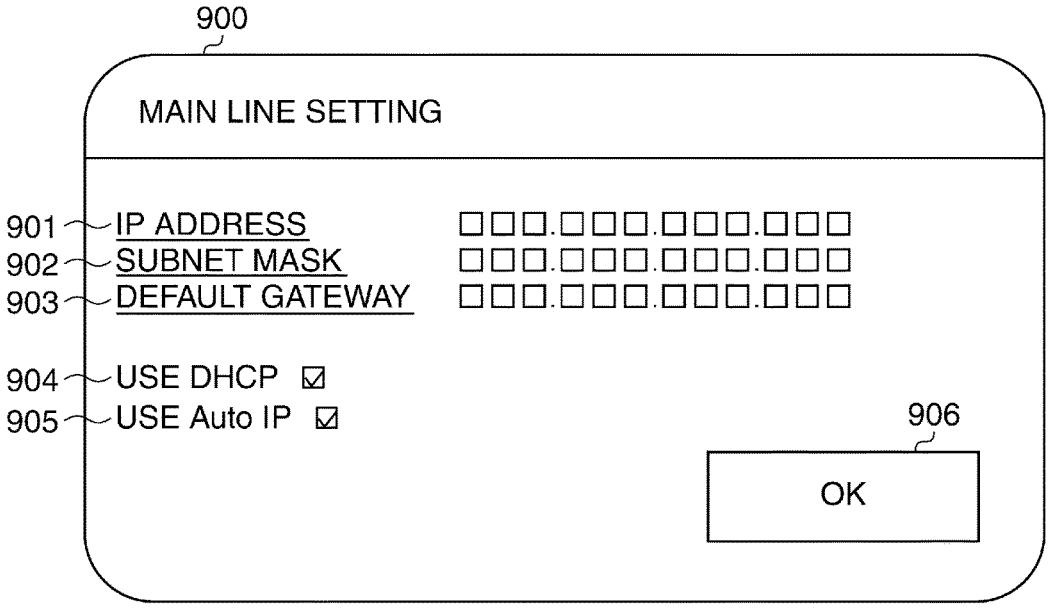

900
MAIN LINE SETTING
901
IP ADDRESS ☐☐☐.☐☐☐.☐☐☐.☐☐☐
902
SUBNET MASK ☐☐☐.☐☐☐.☐☐☐.☐☐☐
903
DEFAULT GATEWAY ☐☐☐.☐☐☐.☐☐☐.☐☐☐
904
USE DHCP ☑
905
USE Auto IP ☑
906
OK

FIG. 10

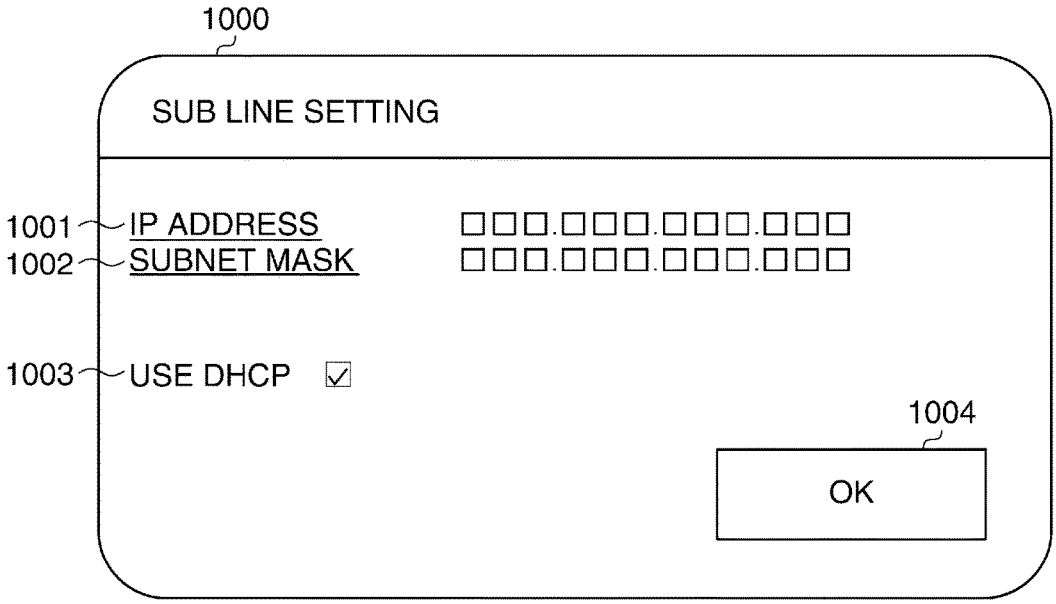

1000
SUB LINE SETTING
1001
IP ADDRESS
□□□.□□□.□□□.□□□
1002
SUBNET MASK
□□□.□□□.□□□.□□□
1003
USE DHCP
☑
1004
OK

FIG. 11

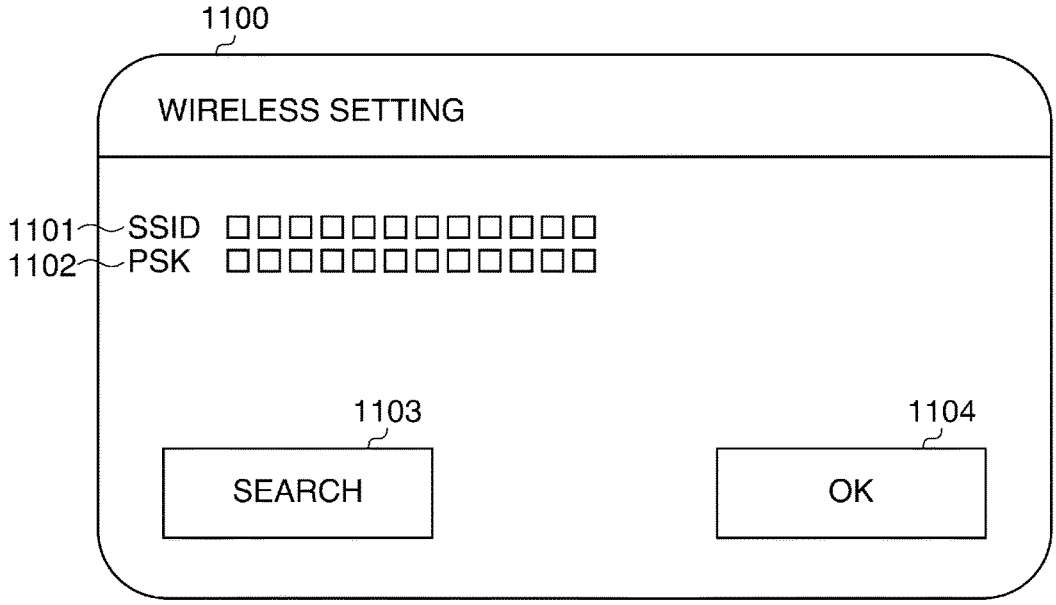

1100
WIRELESS SETTING
1101
SSID
□□□□□□□□□□□□
1102
PSK
□□□□□□□□□□□□
1103
SEARCH
1104
OK

FIG. 12

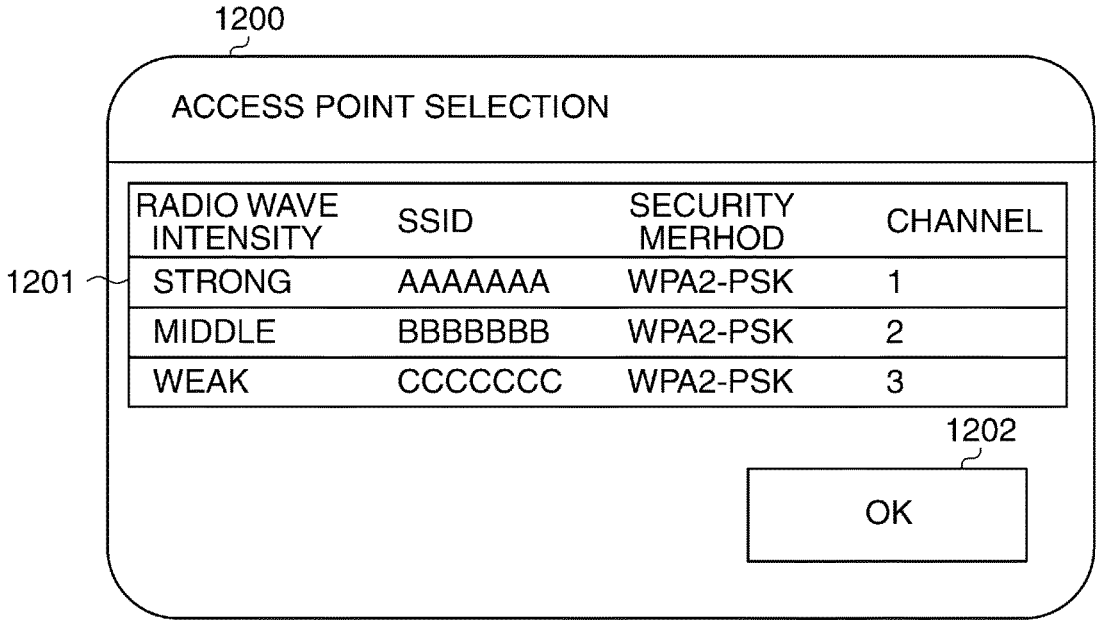

1200
ACCESS POINT SELECTION
RADIO WAVE INTENSITY
SSID
SECURITY MERHOD
CHANNEL
1201
STRONG
AAAAAAA
WPA2-PSK
1
MIDDLE
BBBBBBB
WPA2-PSK
2
WEAK
CCCCCCC
WPA2-PSK
3
1202
OK

FIG. 13

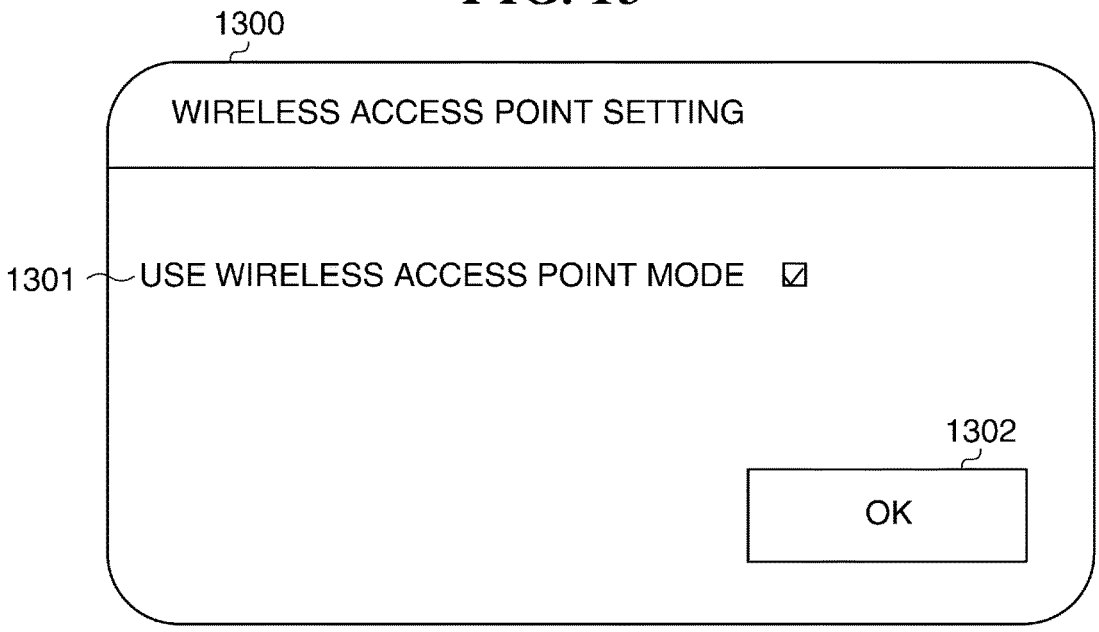

1300
WIRELESS ACCESS POINT SETTING
1301
USE WIRELESS ACCESS POINT MODE ☑
1302
OK

FIG. 14

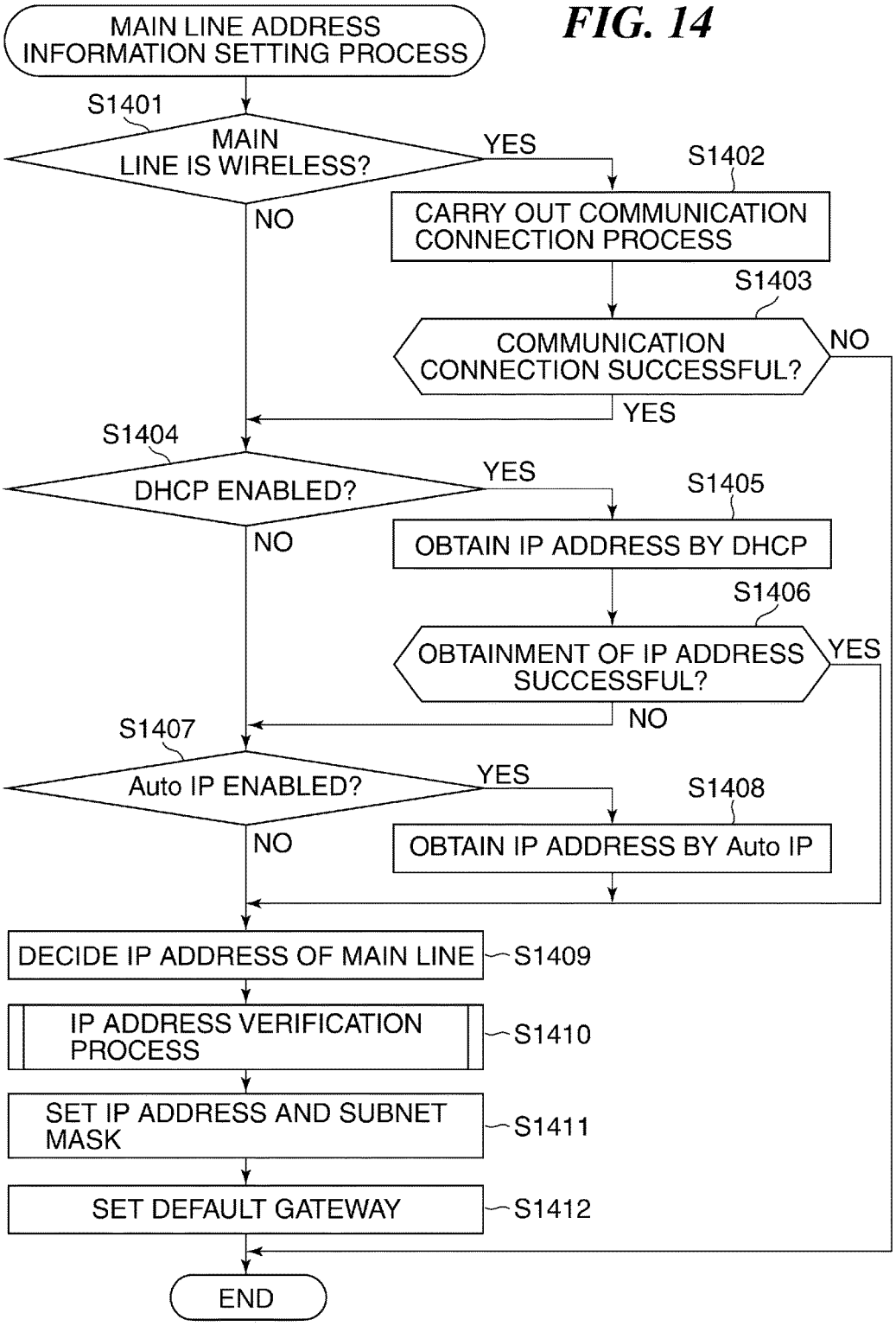

MAIN LINE ADDRESS INFORMATION SETTING PROCESS
S1401
MAIN LINE IS WIRELESS?
YES
NO
S1402
CARRY OUT COMMUNICATION CONNECTION PROCESS
S1403
COMMUNICATION CONNECTION SUCCESSFUL?
NO
YES
S1404
DHCP ENABLED?
YES
NO
S1405
OBTAIN IP ADDRESS BY DHCP
S1406
OBTAINMENT OF IP ADDRESS SUCCESSFUL?
YES
NO
S1407
Auto IP ENABLED?
YES
NO
S1408
OBTAIN IP ADDRESS BY Auto IP
DECIDE IP ADDRESS OF MAIN LINE
S1409
IP ADDRESS VERIFICATION PROCESS
S1410
SET IP ADDRESS AND SUBNET MASK
S1411
SET DEFAULT GATEWAY
S1412
END

FIG. 15

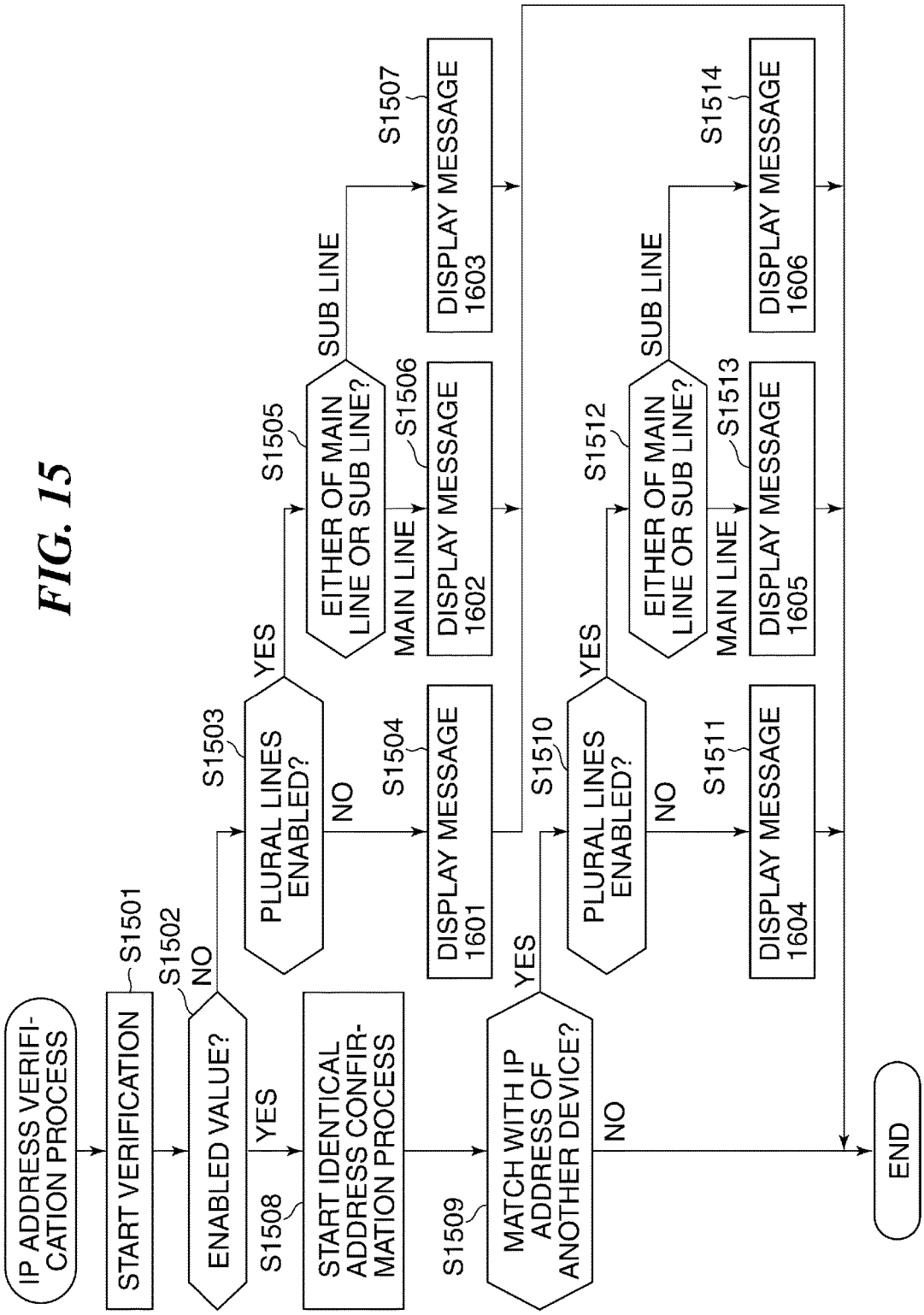

IP ADDRESS VERIFICATION PROCESS
START VERIFICATION
S1501
S1502
ENABLED VALUE?
NO
YES
S1503
PLURAL LINES ENABLED?
YES
NO
S1504
DISPLAY MESSAGE 1601
S1505
EITHER OF MAIN LINE OR SUB LINE?
MAIN LINE
SUB LINE
S1506
DISPLAY MESSAGE 1602
S1507
DISPLAY MESSAGE 1603
S1508
START IDENTICAL ADDRESS CONFIRMATION PROCESS
S1509
MATCH WITH IP ADDRESS OF ANOTHER DEVICE?
YES
NO
S1510
PLURAL LINES ENABLED?
YES
NO
S1511
DISPLAY MESSAGE 1604
S1512
EITHER OF MAIN LINE OR SUB LINE?
MAIN LINE
SUB LINE
S1513
DISPLAY MESSAGE 1605
S1514
DISPLAY MESSAGE 1606
END

FIG. 16A

CONDITION	MESSAGE	
SINGLE LINE MODE	PLEASE CHECK IP ADDRESS	1601
PLURAL LINE MODE AND MAIN LINE	PLEASE CHECK IP ADDRESS OF MAIN LINE	1602
PLURAL LINE MODE AND SUB LINE	PLEASE CHECK IP ADDRESS OF SUB LINE	1603

FIG. 16B

CONDITION	MESSAGE	
SINGLE LINE MODE	ADDRESSES OVERLAP ON NETWORK	1604
PLURAL LINE MODE AND MAIN LINE	ADDRESSES OVERLAP ON NETWORK OF MAIN LINE	1605
PLURAL LINE MODE AND SUB LINE	ADDRESSES OVERLAP ON NETWORK OF SUB LINE	1606

FIG. 17

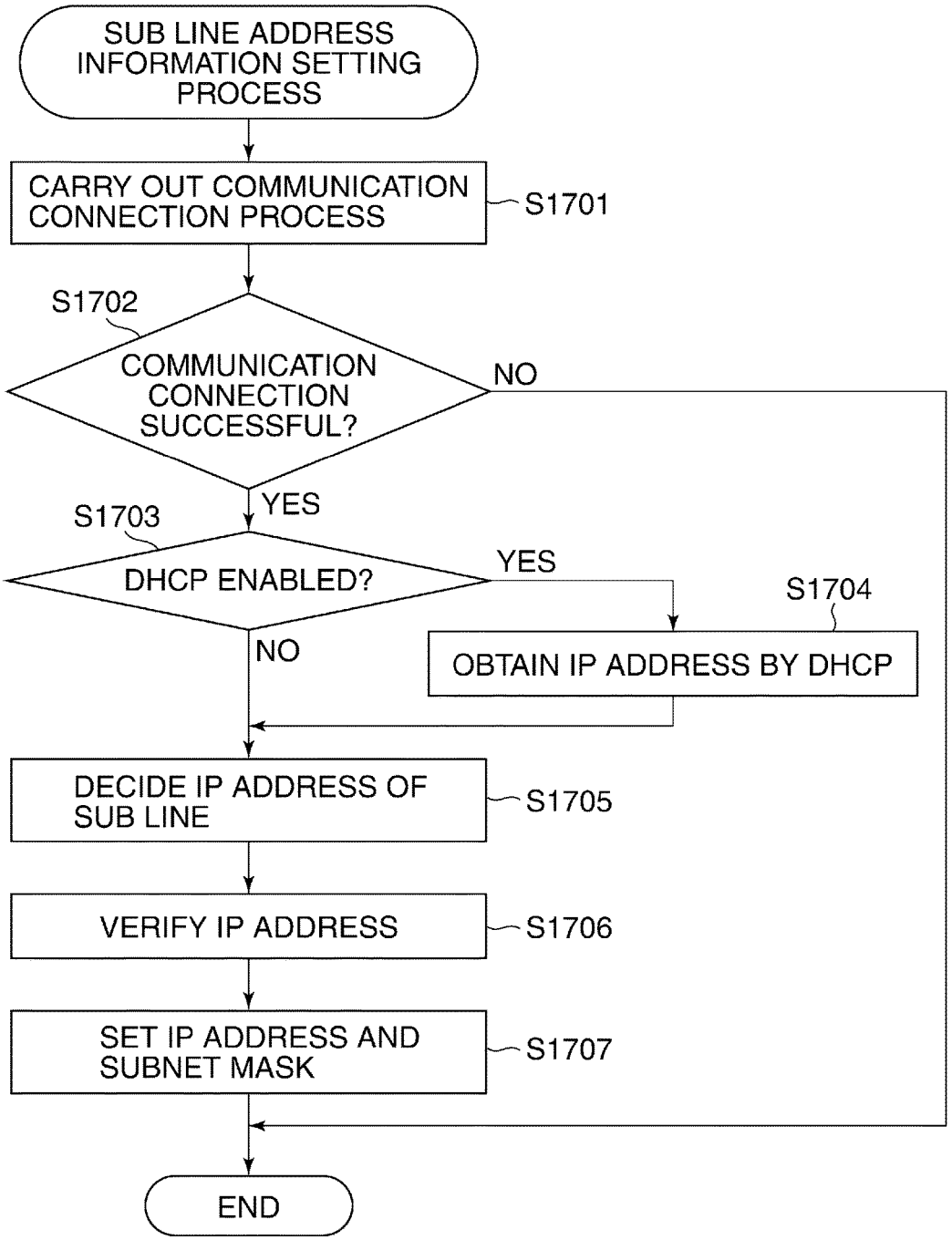

SUB LINE ADDRESS INFORMATION SETTING PROCESS
CARRY OUT COMMUNICATION CONNECTION PROCESS
S1701
S1702
COMMUNICATION CONNECTION SUCCESSFUL?
NO
YES
S1703
DHCP ENABLED?
YES
S1704
OBTAIN IP ADDRESS BY DHCP
NO
DECIDE IP ADDRESS OF SUB LINE
S1705
VERIFY IP ADDRESS
S1706
SET IP ADDRESS AND SUBNET MASK
S1707
END

FIG. 18

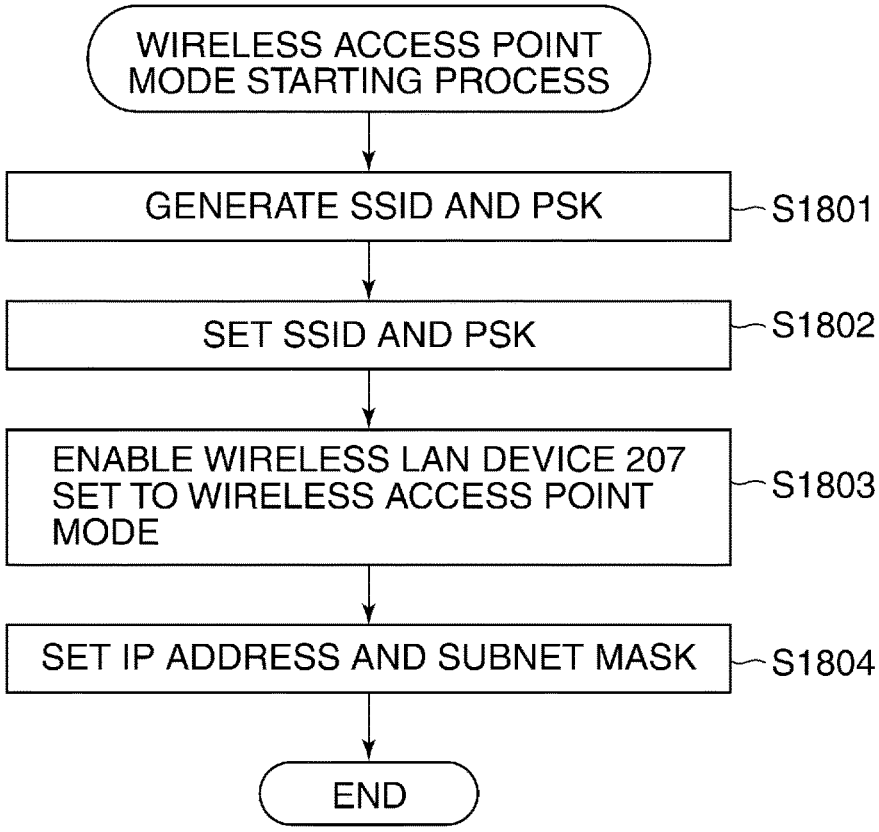
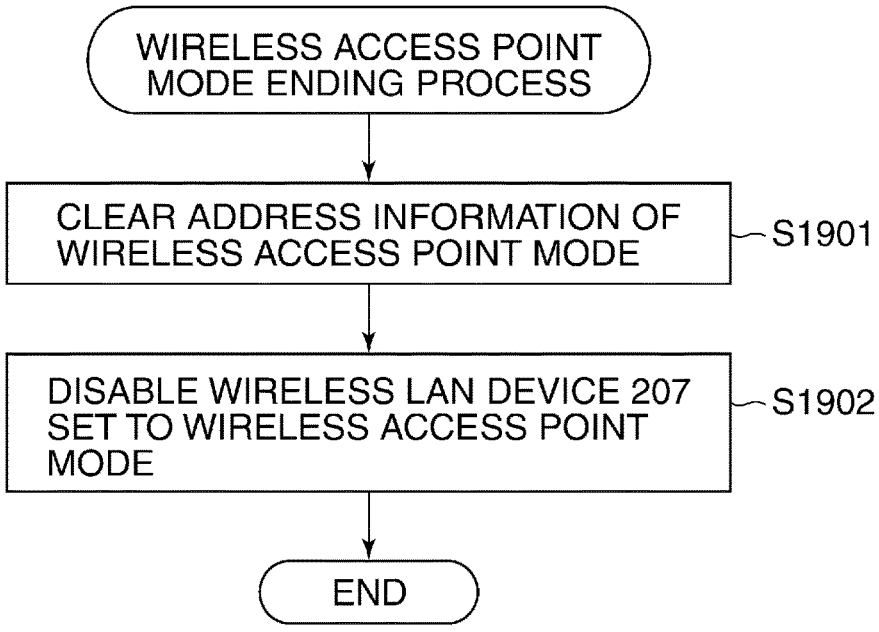

WIRELESS ACCESS POINT MODE STARTING PROCESS
GENERATE SSID AND PSK
S1801
SET SSID AND PSK
S1802
ENABLE WIRELESS LAN DEVICE 207 SET TO WIRELESS ACCESS POINT MODE
S1803
SET IP ADDRESS AND SUBNET MASK
S1804
END

FIG. 19


WIRELESS ACCESS POINT MODE ENDING PROCESS
CLEAR ADDRESS INFORMATION OF WIRELESS ACCESS POINT MODE
S1901
DISABLE WIRELESS LAN DEVICE 207 SET TO WIRELESS ACCESS POINT MODE
S1902
END

INFORMATION PROCESSING APPARATUS CAPABLE OF EASILY CONFIGURING SETTING ON INFRASTRUCTURE TO BE USED, CONTROL METHOD THEREFOR, AND STORAGE MEDIUM

BACKGROUND OF THE INVENTION

Field of the Invention

[0001] The present invention relates to an information processing apparatus, a control method therefor, and a storage medium.

Description of the Related Art

[0002] Generally, a plurality of LANs (local area networks) is used in different ways in an office, a commercial facility, and so on, according to security and the like required for a network. An information processing apparatus employed in an office and the like needs to offer a service with respect to a plurality of LANs, and thus an information processing apparatus equipped with a plurality of communication interfaces is produced (for example, see, Japanese Laid-Open Patent Publication (Kokai) No. 2003-319461). For example, the information processing apparatus comprises a communication interface for performing wired LAN communication and a communication interface for performing wireless LAN communication in a wireless LAN infrastructure mode.

[0003] Whether to use the wired LAN or the wireless LAN infrastructure mode in the information processing apparatus varies depending on a usage of the information processing apparatus and a security policy of an environment where the information processing apparatus is used. Therefore, an administrator of the information processing apparatus needs to configure a setting on which communication interface is to be used among the plurality of communication interfaces of the information processing apparatus, and thus the setting is desired to be configured by an intuitive operation in terms of usability.

SUMMARY OF THE INVENTION

[0004] The present invention provides a solution which enables a user to intuitively configure a setting on an infrastructure to be used and is capable of notifying an error corresponding to the setting.

[0005] Accordingly, the present invention provides an information processing apparatus comprising a setting unit configured to set an interface to be enabled in the information processing apparatus in accordance with an instruction by a user, and a notification unit configured to notify an error, wherein the setting unit sets statuses of a wired interface and a wireless interface as any one of followings: enabling the wired interface without enabling the wireless interface, enabling the wireless interface without enabling the wired interface, and enabling both the wired interface and the wireless interface, and the notification unit notifies an error corresponding to the setting set by the setting unit.

[0006] According to the present invention, the user is able to intuitively configure the setting on the infrastructure to be used, and the error corresponding to the setting is notified.

[0007] Further features of the present invention will become apparent from the following description of exemplary embodiments (with reference to the attached drawings).

BRIEF DESCRIPTION OF THE DRAWINGS

[0008] FIG. **1** is a block diagram schematically showing an arrangement of an MFP as an information processing apparatus according to an embodiment of the present invention.

[0009] FIG. **2** is a block diagram schematically showing an arrangement of a controller unit appearing in FIG. **1**.

[0010] FIG. **3** is a block diagram schematically showing an arrangement of software modules controlled by the controller unit appearing in FIG. **1**.

[0011] FIG. **4** is a view showing an example of a menu screen displayed on an operating unit appearing in FIG. **1**.

[0012] FIGS. **5**A and **5**B are views showing examples of screens for instructing start and end of a wireless access point mode in the MFP appearing in FIG. **1**.

[0013] FIG. **6** is a view showing an example of a setting screen displayed on the operating unit appearing in FIG. **1**.

[0014] FIG. **7** is a view showing an example of a network setting screen displayed on the operating unit appearing in FIG. **1**.

[0015] FIG. **8** is a view showing an example of an interface selection screen displayed on the operating unit appearing in FIG. **1**.

[0016] FIG. **9** is a view showing an example of a main line setting screen displayed on the operating unit appearing in FIG. **1**.

[0017] FIG. **10** is a view showing an example of a sub line setting screen displayed on the operating unit appearing in FIG. **1**.

[0018] FIG. **11** is a view showing an example of a wireless setting screen displayed on the operating unit appearing in FIG. **1**.

[0019] FIG. **12** is a view showing an example of an access point selection screen displayed on the operating unit appearing in FIG. **1**.

[0020] FIG. **13** is a view showing an example of a wireless access point setting screen displayed on the operating unit appearing in FIG. **1**.

[0021] FIG. **14** is a flowchart showing a procedure of a main line address information setting process carried out by a network setting module appearing in FIG. **3**.

[0022] FIG. **15** is a flowchart showing a procedure of an IP address verification process in step **S1410** in FIG. **14**.

[0023] FIGS. **16**A and **16**B are views showing examples of messages displayed on the operating unit appearing in FIG. **1**.

[0024] FIG. **17** is a flowchart showing a procedure of a sub line address information setting process carried out by the network setting module appearing in FIG. **3**.

[0025] FIG. **18** is a flowchart showing a procedure of a wireless access point mode starting process carried out by the network setting module appearing in FIG. **3**.

[0026] FIG. **19** is a flowchart showing a procedure of a wireless access point mode ending process carried out by the network setting module appearing in FIG. **3**.

DESCRIPTION OF THE EMBODIMENTS

[0027] An embodiment of the present invention will now be described with reference to the accompanying drawings. In the present embodiment, a description will be given of a case where the present invention is applied to an MFP as an information processing apparatus, but the present invention may be applied not only to the MFP but to a communication apparatus such as a PC equipped with a plurality of liens.

[0028] FIG. **1** is a block diagram schematically showing an arrangement of the MFP **101** as an information processing apparatus according to the embodiment of the present invention.

[0029] In FIG. **1**, the MFP **101** is connected with a client PC **103** and a DHCP (dynamic host configuration protocol) server **104** as communication apparatuses constituting a LAN **102** in a wired infrastructure by a wired cable, not shown. The MFP **101** performs wired LAN communication with the client PC **103** and the DHCP server **104**. In the LAN **102**, the DHCP server **104** allocates an IP address to each of the MFP **101** and the client PC **103**. For example, the client PC **103** designates an IP address of the MFP **101** allocated by the DHCP server **104** to access to the MFP **101** and starts data communication with the MFP **101**. The MFP **101** performs wireless LAN communication with a client PC **107** as a communication apparatus constituting a LAN **106** in a wireless infrastructure via an access point **105** communicatively connected to the MFP **101**. Further, the MFP **101** itself functions as an access point and directly performs wireless communication with a client PC **109** as a communication apparatus constituting a LAN **108**.

[0030] The MFP **101** has a plurality of lines, and in the present embodiment, an explanation will be given of an arrangement in which the MFP **101** has one main line and one sub line as an example. The MFP **101** is able to concurrently operate the wired infrastructure and the wireless infrastructure, and in this embodiment, one of the wired infrastructure and the wireless infrastructure is used as the main line, and the other is used as the sub line.

[0031] Next, an explanation will be given of the arrangement of the MFP **101**. The MFP **101** has a controller unit **110**, a printer unit **111**, a scanner unit **112**, and an operating unit **113**, and the controller unit **110** is connected with the printer unit **111**, the scanner unit **112**, and the operating unit **113**.

[0032] The controller unit **110** collectively controls overall operation of the MFP **101**. The printer unit **111** performs printing on a sheet based on print data received from the communication apparatuses such as the client PCs **103**, **107**, and **109**. The scanner unit **112** scans an original and generates image data. The operating unit **113** has a display unit and a plurality of operation keys, not shown. For example, the operating unit **113** displays an operation screen for configuring settings on the MFP **101** on the display unit and receives an instruction input by a user operating the operation keys.

[0033] FIG. **2** is a block diagram schematically showing an arrangement of the controller unit **110** appearing in FIG. **1**.

[0034] In FIG. **2**, the controller unit **110** has a CPU **201**, a DRAM **202**, an I/O controller **202**, a SATA I/F **204**, an HDD **205**, a network I/F **206**, a wired LAN device **207**, and a wireless LAN device **208**. The controller unit **110** also has a panel I/F **209**, a printer I/F **210**, and a scanner I/F **211**. The CPU **201** is connected with the DRAM **202** and the I/O controller **203**. The I/O controller **203**, the SATA I/F **204**, the network I/F **206**, the panel I/F **209**, the printer I/F **210**, and the scanner I/F **211** are connected with one another via a bus **212**. The SATA I/F **204** is connected with the HDD **205**. The network I/F **206** is connected with the wired LAN device **207** and the wireless LAN device **208** which are communication interfaces.

[0035] The CPU **201** carries out a computation process for performing various controls in the controller unit **110** and transmits various control instructions to the I/O controller **203**. The DRAM **202** is used as a work area for the CPU **201** and as a temporal storage area of various types of data. The I/O controller **203** transfers a control instruction by the CPU **201** to component elements connected via the bus **212**. The SATA I/F **204** performs control to write data in the HDD **205** and performs controls to read out data stored in the HDD **205** in accordance with the control instruction by the CPU **201**. The HDD **205** stores programs for implementing functions of the MFP **101**, image data, and the like.

[0036] The network I/F **206** controls each of the wired LAN device **207** and the wireless LAN device **208** in accordance with the control instruction by the CPU **201**. The wired LAN device **207** controls wired LAN communication performed with the client PC **103** and the like constituting the LAN **102** in the wired infrastructure. The wireless LAN device **208** has a wireless infrastructure mode and a wireless access point mode. In the wireless infrastructure mode, wireless LAN communication is performed via the client PC **107** and the access point **105** constituting the LAN **106** in the wireless infrastructure. In the wireless access point mode, the MFP **101** functions as an access point and directly performs the wireless communication with the client PC **109** constituting the LAN **108**. Hereinafter, the wireless communication in the wireless access point mode is defined as "a Wireless Direct".

[0037] The panel I/F **209** performs display control in the operating unit **113** in accordance with the control instruction by the CPU **201** and transfers a content input by the user operating the operating unit **113** to the CPU **201**. The printer OF **210** causes the printer unit **111** to carry out a printing process in accordance with the control instruction by the CPU **201**. The scanner I/F **211** causes the scanner unit **112** to carry out a scanning process in accordance with the control instruction by the CPU **201**.

[0038] FIG. **3** is a block diagram schematically showing an arrangement of software modules controlled by the controller unit **110** appearing in FIG. **1**.

[0039] In FIG. **3**, the MFP **101** has an operation control module **301**, a data storage module **302**, a network setting module **303**, a DHCP control module **304**, and a TCP/IP control module **305**. The MFP **101** also has a WPA (Wi-Fi protected access) control module **306**, a job control module **307**, an image processing module **308**, a print processing module **309**, and a readout processing module **310**. Controls on the above-described modules are performed by the CPU **201** implementing programs stored in the HDD **205**.

[0040] The operation control module **301** performs display control on the display screen and the like in the operating unit **113** and receives operations by the user on the operation screen and the operation keys. The data storage module **302** performs controls to write data such as a setting value into the HDD **205** and read out data stored in the HDD **205**. The network setting module **303** performs control on network settings of the MFP **101** and requests the DHCP

control module **304** and the WPA control module **306** and the like to carry out processing. For example, when the user configures a setting to use the IP address allocated by the DHCP server **104** as address information of the MFP **101**, the network setting module **303** requests the DHCP control module **304** to carry out the following processing. The DHCP control module **304** controls a process of allocating an IP address in accordance with a protocol defined as a DHCP by RFC 2131. The TCP/IP control module **305** carries out a process of sending/receiving a network packet. When receiving a request from the network setting module **303**, the WPA control module **306** carries out a wireless access authentication process in accordance with a predetermined encryption method, for example, a WPA protocol. It should be note that although in the present embodiment, an explanation will be given of a case where a WPA-PSK encryption method is used when the wireless LAN communication is performed, the encryption method is not limited to this. For example, the encryption method may be a WEP, WPA-EAP or the like, and the encryption method may not be used in the wireless LAN communication.

[0041] The job control module **307** performs control on execution of a job and issues an execution instruction relating to a job with respect to the image processing module **308**, the print processing module **309** and the readout processing module **310**. Upon receiving the execution instruction from the job control module **307**, the image processing module **308** carries out image processing such as processing of image data into data formats suitable for respective usages. Upon receiving the execution instruction from the job control module **307**, the print processing module **309** controls the printer unit **111** to carry out the printing process. Upon receiving the execution instruction from the job control module **307**, the readout processing module **310** controls the scanner unit **112** to carry out the scanning process.

[0042] Next, an explanation will be given of a menu screen **400** in FIG. **4** displayed on the operating unit **113**. The menu screen **400** is an operation screen for the user to select functions of the MFP **101**. The menu screen **400** has an information notifying area **401**, a copy button **402**, a scan and store button **403**, a scan and send button **404**, a wireless access point button **405**, and a setting button **406**. In the information notifying area **401**, a notification to the user is displayed. The copy button **402** is selected when the user uses the copying function. The scan and store button **403** is selected when the user uses a function to store image data obtained by the MFP **101** performing scanning. The scan and send button **404** is selected when the user uses a function to send the image data obtained by the MFP **101** performing scanning to the communication apparatus. The wireless access point button **405** is selected when the MFP **101** is to sifted into the wireless access point mode. The wireless access point button **405** is displayed on the menu screen **400** when a wireless access point mode enabling setting **1301** in FIG. **13**, to be described later, is set to ON. When the user selects the wireless access point button **405**, a start setting screen **500** in FIG. **5**A, to be described later, is displayed on the operating unit **113**. The setting button **406** is selected when the user changes settings on the MFP **101**. When the user selects the setting button **406** in the menu screen **400**, a setting screen **600** in FIG. **6**, to be described later, is displayed on the operating unit **113**.

[0043] The start setting screen **500** in FIG. **5**A is a setting screen for instructing start of the Wireless Direct. When a user selects a start button **501** in the start setting screen **500**, an instruction to start shifting to the wireless access point mode is issued to the network setting module **303**. As a result, the MFP **101** operates as an access point and becomes ready to start the Wireless Direct with the client PC **109** and the like. Namely, in the present embodiment, the user can instruct to start shifting to the wireless access point mode by an easy operation of merely selecting the wireless access point button **405** in the menu screen **400** and selecting the start button **501** in the start setting screen **500**.

[0044] When the user selects the start button **501**, a setting information screen **502** in FIG. **5**B is displayed on the operating unit **113**. In the setting information screen **502**, setting information such as an SSID, PSK, or the like required for communicatively connecting the client PC **109** and the like with the MFP **101** as the access point. When the user selects an end button **503** in the setting information screen **502**, an instruction to end the wireless access point mode is issued to the network setting module **303**. As a result, the MFP **101** ends the Wireless Direct with the client PC **109**.

[0045] The setting screen **600** in FIG. **6** is an operation screen for guiding the user to a setting screen for configuring detailed information of each setting and has a device setting button **601**, a user setting button **602**, and a network line setting button **603**. The device setting button **601** is an operation button for displaying a device setting screen, not shown, for configuring setting on devices of the MFP **101**. The user setting button **602** is an operation button for displaying a user setting screen, not shown, for configuring settings on users of the MFP **101**. The network line setting button **603** is an operation button for displaying a network setting screen in FIG. **7** for configuring network settings on the MFP **101**.

[0046] The network setting screen **700** in FIG. **7** is an operation screen for guiding the user to a setting screen for configuring a setting on detailed information of the network settings. The network setting screen **700** has an interface selection button **701**, a main line setting button **702**, a sub line setting button **703**, a wireless setting button **704**, a wireless access point setting button **705**, and a setting reflection button **706**. The interface selection button **701** is an operation button for displaying an interface selection screen **800** in FIG. **8**, to be described later. The main line setting button **702** is an operation button for displaying a main line setting screen **900** in FIG. **9**, to be described later. The sub line setting button **703** is an operation button for displaying a sub line setting screen **1000** in FIG. **10**, to be described later. The wireless setting button **704** is an operation button for displaying a wireless setting screen **1100** in FIG. **11**, to be described later. The wireless access point setting button **705** is an operation button for displaying a wireless access point setting screen **1300** in FIG. **13**, to be described later. The setting reflection button **706** is an operation button for storing a setting value set by the user in the HDD **205** and instructing reflection of the settings to the network setting module **303**.

[0047] The interface selection screen **800** in FIG. **8** is a setting screen for configuring a setting on the wired infrastructure and the wireless infrastructure in the MFP **101**. Settings in the interface selection screen **800** are configured by an administrator or the like of the MFP **101**, and the

settings are not changed frequently. The interface selection screen **800** is displayed on the operating unit **113** when a plurality of operations is performed, for example, when the user selects the setting button **406**, the network line setting button **603**, and the interface selection button **701** in this order. When wired-only **801** is set to ON, the MFP **101** uses the wired infrastructure only. When wireless-only **802** is set to ON, the MFP **101** uses the wireless infrastructure only. When wired (main)+wireless (sub) **803** is set to ON, the MFP **101** uses both the wired infrastructure and the wireless infrastructure. Specifically, the MFP **101** uses the wired infrastructure as a main line and uses the wireless infrastructure as a sub line. In the interface selection screen **800**, only one of the wired-only **801**, the wireless-only **802**, and the wired (main)+wireless (sub) **803** can be set to ON. When an OK button **804** is selected, a setting value set in the interface selection screen **800** is stored in the DD **205**. It should be noted that in the present embodiment, the setting on the wireless infrastructure is not associated with the setting on the Wireless Direct, and the setting value set in the interface selection screen **800** does not affects the setting on the Wireless Direct.

[0048] The main line setting screen **900** in FIG. **9** is an operation screen for setting address information of the main line of the MFP **101**. To an IP address input section **901**, a subnet mask input section **902**, and a default gateway input section **903**, the user is able to input an arbitral IP address, subnet mask, and default gateway, respectively. When a DHCP selection section **904** is set ON, a setting to obtain an IP address included in the address information of the main line from the DHCP server on the main line network is configured. When an Auto IP (automatic private IP addressing) selection section **905** is set to ON, a setting to determine an IP address included in the address information of the main line by an Auto IP protocol is configured. When an OK button **906** is selected, the setting values set in the main line setting screen **900** are stored in the HDD **205**.

[0049] The sub line setting screen **1000** in FIG. **10** is an operation screen for setting address information of the sub line of the MFP **101**. The user is able to input arbitral IP address and subnet mask in an IP address input section **1001** and a subnet mask input section **1002**. When a DHCP selection section **1003** is set to ON, a setting to obtain an IP address included in the address information of the sub line from the DHCP server on the network of the subline is configured. When an OK button **1004** is selected, setting values set in the sub line setting screen **1000** are stored in the HDD **205**. It should be noted that in the present embodiment, in order to concurrently use the plurality of lines, a part of functions on the sub line side is limited; for example, the sub line cannot use a default gateway and an Auto IP. For this reason, in the present embodiment, the sub line is used, for example, as a line with which communication is performed within a network set in advance. On the other hand, the main line is used as a line with which communication is performed via a plurality of networks including an external network by using the default gateway other than the network set in advance. The sub line setting screen **1000** does not have a setting item for using the default gateway and the Auto IP. Besides, functions such as DNS, 802.1x, IPsec, IP filter, port filter, MAC address filter, SMB, HTTP, WebDAV, and FTP cannot be used on the subline side.

[0050] The wireless setting screen **1100** in FIG. **11** is an operation screen for configuring a authentication setting in the wireless infrastructure mode. An SSID of an access point to which the user wish to access and a key corresponding to the SSID is input to an SSID input section **1101** and a PSK input section **1102**, respectively. When a search button **1103** is selected, an access point selection screen **1200** in FIG. **12** for selecting an access point is displayed on the operating unit **113**. When an OK button **1104** is selected, setting values set in the wireless setting screen **1100** are stored in the HDD **205**.

[0051] The access point selection screen **1200** in FIG. **12** is an operation screen for setting an access point to be used by the MFP **101**. A list of access points which can be used by the MFP **101** is displayed on a search result display section **1201**. When the access point **105**, for example, is selected from the list of the access points displayed on the search result display section **1201**, and information indicative of the access point **105** is stored in the HDD **205**. Thereafter, the wireless setting screen **1100** with the SSID of the access point **105** is set in the SSID input unit **101** is then displayed on the operating unit **113**.

[0052] An wireless access point setting screen **1300** in FIG. **13** is a setting screen for configuring a setting on the wireless access point mode. The settings in the wireless access point setting screen **1300** are also configured by the administrator of the MFP **101** and are not frequently changed. When a wireless access point mode enabling setting **1301** is set to ON, the wireless access point mode of the MFP **101** is enabled. The menu screen **400** displayed on the operating unit **113** with the wireless access point mode enabled includes the wireless access point button **405** for displaying the start setting screen **500** for instructing shifting to the wireless access point mode. On the other hand, when the wireless access point mode enabling setting **1301** is set to OFF, the wireless access point mode of the MFP **101** is disabled. The menu screen **400** displayed on the operating unit **113** with the wireless access point mode disabled does not include the wireless access point button **405**. When an OK button **1302** is selected, setting values set in the wireless access point setting screen **1300** are stored in the HDD **205**, and a screen on the operating unit **113** is switched to the network setting screen **700**.

[0053] In the present embodiment described above, the user selects any one of the "wired-only **801**", "wireless-only **802**", and "wired (main)+wireless (sub) **803**" on the interface selection screen **800**. Accordingly, the user is able to intuitively configure a setting on an infrastructure to be used.

[0054] Moreover, in the present embodiment described above, the main line uses the default gateway, and the sub line does not use the default gateway. Accordingly, the user is able to intuitively configure a setting on an infrastructure to be used under an environment in which the main line which performs communication using a variety of networks constituted by using the default gateway and the sub line which performs communication within a network set in advance only are used properly.

[0055] Further, in the present embodiment described above, the interface selection screen **800** is displayed on the operation screen **113** by the user performing a plurality of operations on the MFP **101**. The settings in the interface selection screen **800** are to be configured by the administrator of the MFP **101**, and it is necessary to manage the MFP **101** so that a general user cannot change the settings easily. On the other hand, it is conceivable that a user authentication is performed to authenticate a user who operates the inter-

face selection screen **800**, however, in this case, user information required for the user authentication is necessary to be registered in advance, which takes labor. To solve this problem, in the present embodiment, the interface selection screen **800** is displayed on the operating unit **113** by the user performing the plurality of operations on the MFP **101**. As a result, it is possible to manage the MFP **101** so that the general user cannot change the settings in the interface selection screen **800** easily without registering in advance the user information required for the user authentication for operating the interface selection screen **800**.

[0056] In the present embodiment described above, the interface selection screen **800** includes only the setting items set by the administrator of the MFP **101**. This eliminates necessity for the general user to operate the interface selection screen **800**, and at least, eliminates a fear that the general user intentionally displays the interface selection screen **800** on the operation screen **113**. As a result, an erroneous operation of the general user on the interface selection screen **800** can be prevented.

[0057] Next, a description will be given of a process regarding a setting on the address information of the MFP **101**.

[0058] FIG. **14** is a flowchart showing a procedure of an address information setting process for the main line carried out by the network setting module **303** appearing in FIG. **3**.

[0059] The process in FIG. **14** is carried out by the CPU **201** implementing a program stored in the HDD **205**. The process in FIG. **14** is also carried out when a system of the MFP **101** is started or when the setting reflection button **706** in the network setting screen **700** is selected. Moreover, the process in FIG. **14** is carried out on an assumption that at least the settings on the screens in FIGS. **8**, **9** and **11** are already configured.

[0060] In FIG. **14**, at first, the network setting module **303** determines whether the main line is wireless (step S**1401**). In step S**1401**, when the setting value indicative of the "wireless-only **802**" is stored in the HDD **205**, the network setting module **303** determines that the main line is wireless. on the other hand, when the setting value indicative of either of the "wired-only **801**" or "wired (main)+wireless (sub) **803**" is stored in the HDD **205**, the network setting module **303** determines that the main line is not wireless.

[0061] As a result of determination in step S**1401**, when the main line is wireless, the network setting module **303** carries out a communication connecting process with an access point set on the wireless setting screen **1100**, for example, the access point **105** (step S**1402**). In the above communication connecting process, the network setting module **303** requests the WPA control module **306** to carry out the process. Accordingly, the WPA control module **306** obtains an SSID and a PSK of the access point **105** from the data storage module **320** and transmits an authentication request generated based on the obtained PSK to the access point **105**. The WPA control module **306** receives a determination result as to connection possible/impossible from the access point **105**. The network setting module **303** then determines whether the communication connection with the access point **105** was successful (step S**1403**). In step S**1403**, when the received determination result indicates connection possible, the network setting module **303** determines that the communication connection with the access point **105** was successful. On the other hand, the received determination result indicates connection impossible, the network setting module **303** determines that the communication connection with the access point **105** was unsuccessful.

[0062] As a result of the determination in step **1403**, when the communication connection with the access point **105** was unsuccessful, the network setting module **303** terminates the present process.

[0063] When the main line is not wireless as a result of the determination in step S**1401** or when the communication connection with the access point **105** was successful as a result of the determination in step S**1403**, the network setting module **303** determines whether the DHCP is enabled (step S**1404**). In step S**1404**, when a setting value indicating that the DHCP selection section **904** is ON is stored in the HDD **205**, the network setting module **303** determines that the DHCP is enabled. On the other hand, when a setting value indicating that the DHCP selection section **904** is OFF, the network setting module **303** determines that the DHCP is disabled.

[0064] As a result of the determination in step S**1404**, when the DHCP is enabled, the network setting module **303** obtains an IP address by the DHCP (step S**1405**). In step S**1405**, the network setting module **303** requests the DHCP control module **304** to carry out the process. Accordingly, the DHCP module **304** searches the DHCP server on the network of the main line of the MFP **101** in accordance with the DHCP protocol. The DHCP control module **304** obtains an IP address allocated by the searched DHCP server and registers usage of the obtained IP address to the DHCP server. The network setting module **303** then determines whether the obtainment of the IP address by the DHCP was successful (step S**1406**).

[0065] As a result of the determination in step S**1406**, when the obtainment of the IP address by the DHCP was successful, the network setting module **303** carries out a process in step S**1409**, to be described later.

[0066] When the DHCP is disabled as a result of the determination is step S**1404** or when the obtainment of the IP address by the DHCP was unsuccessful as a result of the determination in step S**1406**, the network setting module **303** determines whether an Auto IP is enabled (step S**1407**). In step S**1407**, when a setting value indicating that the Auto IP selection section **905** is ON is stored in the HDD **205**, the network setting module **303** determines that the Auto IP is enabled. On the other hand, when a setting value indicating that the Auto IP selection section **905** is OFF is stored in the HDD **205**, the network setting module **303** determines that the Auto IP is disabled.

[0067] As a result of the determination in step S**1407**, when the Auto IP is enabled, the network setting module **303** obtains an IP address by the Auto IP (step S**1408**). In step S**1408**, the network setting module **303** carries out a selection process in which it selects in a random manner one IP address from an IP address range prescribed in advance for the Auto IP. The network setting module **303** also carries out a confirmation process in which it confirms that no communication apparatus to which the IP address is set exists on the network of the main line by using the ARP protocol. When a communication apparatus to which the IP address is set exists on the network of the main line, the network setting module **303** repeats the above selection process and the above confirmation process until an IP address which is not used by all communication apparatus on the network of

the main lime. The network setting module **303** then decides the address information of the main line of the NFP **101** (step **1409**).

[0068] For example, when the DHCP is enabled, the network setting module **303** decides the IP address obtained by the searched DHCP server, a subnet mask corresponding to the IP address, and the default gateway as the address information of the main line. When the DHCP is enabled, the obtainment of the IP address from the DHCP server was unsuccessful, and the Auto IP is enabled, or when the DHCP is disabled and the Auto IP is enabled, the network setting module **303** decides that the IP address obtained by the Auto IP, a subnet mask corresponding to the IP address, and the default gateway as the address information of the main line. When the DHCP is enabled, the obtainment of the IP address from the DHCP server was unsuccessful, and the Auto IP is disabled, the network setting module **303** decides a disabled address (0. 0. 0. 0), a subnet mask corresponding to the disabled address, and the default gateway as the address information of the main line. When both of the DHCP and the Auto IP are disabled, the network setting module **303** decides the setting values input to the IP address input section **901**, the subnet mask input section **902**, and the default gateway input section **903** as the address information of the main line.

[0069] The network setting module **303** then carries out an IP address verification process in FIG. **15**, to be described later (S**1410**) to verify the IP address of the decided address information. The network setting module **303** then sets the IP address and the subnet mask of the decided address information to the TCP/IP control module **305** (step S**1411**). The network setting module **303** then sets the default gateway of the decided address information to the TCP/IP control module **305** (step S**1412**) and terminates the present process.

[0070] FIG. **15** is a flowchart showing a procedure of the IP address verification process in step S**1410** in FIG. **14**.

[0071] In FIG. **15**, the network setting module **303** start verification of the IP address of the decided address information (step S**1501**) and determines whether the IP address is an enabled value (step S**1502**). In step S**1502**, when the IP address is the disabled address (0. 0. 0. 0), the network setting module **303** determines that the IP address is not the enabled value. On the other hand, when the IP address is not the disabled address, the network setting module **303** determines that the IP address is the enabled value.

[0072] As a result of the determination in step S**1502**, when the IP address is not the enabled value, the network setting module **303** determines whether the plurality of lines is enabled (step S**1503**). In step S**1503**, when the setting value indicative of a plural line mode, specifically, a setting indicative of the "wired (main)+wireless (sub) **803**" is stored in the HDD **205**, the network setting module **303** determines that the plurality of lines is enabled. On the other hand, when the setting value indicative of a single line mode, specifically, the setting value indicative of either of the "wired-only **801**" or "wireless-only **802**" is stored in the HDD **205**, the network setting module **303** determines that the plurality of lines is not enabled.

[0073] As a result of the determination in step S**1503**, when the plurality of lines is not enabled, the network setting module **303** displays a massage **1601** in FIG. **16**A prompting the user to check the IP address on the operating unit **113** (step S**1504**). Accordingly, the user is able to easily grasp that a defects occurs in the IP address set in the single line mode. Thereafter, the network setting module **303** terminates the present process.

[0074] As a result of the determination in step S**1503**, when the plurality of lines is enabled, the network setting module **303** determines whether the IP address is either of an IP address of the main line or an IP address of the sub line (step S**1505**).

[0075] As a result of the determination in step S**1505**, when the IP address is the IP address of the main line, the network setting module **303** displays a massage **1602** in FIG. **16**A prompting the user to check the IP address of the main line (step S**1506**). Accordingly, the user is able to easily grasp that a defect occurs in the IP address set for the main line in the plural line mode. Thereafter, the network setting module **303** terminates the present process.

[0076] As a result of the determination in step S**1505**, when the IP address is the IP address of the sub line, the network setting module **303** displays a massage **1603** in FIG. **16**A prompting the user to check the IP address of the sub line. Accordingly, the user is able to easily grasp that a defect occurs in the IP address set for the sub line in the plural line mode. Thereafter, the network setting module **303** terminates the present process.

[0077] As a result of the determination in step S**1502**, when the IP address is the enabled value, the network setting module **303** starts an identical IP address confirmation process (step S**1508**). In the identical IP address confirmation process, it is confirmed that apparatuses to each of which the same IP address is allocated exist on the network which uses IP addresses. The network setting module **303** then determines whether the IP address matches with an IP address of another apparatus on the network which uses IP addresses (step S**1509**). Specifically, the network setting module **303** uses the ARP protocol to inquire existence of the IP address to the network which uses IP addresses. Upon receiving a reply to the inquiry, the network setting module **303** determines that the another apparatus to which the same IP address is allocated as the IP address exists, that is, the IP address matches with the IP address of the another apparatus. On the other hand, a reply to the inquiry is not received, the network setting module **303** determines that another apparatus to which the same IP address is allocated as the IP address does not exist and the IP address does not match the IP address of the another apparatus.

[0078] As a result of the determination in step S**1509**, when the IP address does not match the IP address of the another apparatus, the network setting module **303** terminates the present process. On the other hand, as a result of the determination in step S**1509**, when the IP address matches with the IP address of the another apparatus, the network setting module **303** determines whether the plurality of lines is enabled (step S**1510**).

[0079] As a result of the determination in step S**1510**, when the plurality of lines is not enabled, the network setting module **303** displays a massage **1604** in FIG. **16**B indicating that the IP address overlaps on the network on the operating unit **113** (step S**1511**). As a result, the user is able to easily grasp that the IP address set in the single line mode matches with the IP address of the another apparatus. Thereafter, the network setting module **303** terminates the present process.

[0080] As a result of the determination in step S**1510**, when the plurality of lines is enabled, the network setting

module **303** determines whether the IP address is either of the IP address of the main line or the IP address of the sub line (step S**1512**).

[0081] As a result of the determination in step S**1512**, when the IP address is the IP address of the main line, the network setting module **303** displays a message **1605** in FIG. **16**B on the operating unit **113** (step S**1513**). The message **1605** indicates that the IP address of the main line matches with the IP address of the another apparatus on the network. As a result, the user is able to easily grasp that the IP address set for the main line in the plural line mode matches with the IP address of the anther apparatus. Thereafter, the network setting module **303** terminates the present process.

[0082] As a result of the determination in step S**1512**, when the IP address is the IP address of the sub line, the network setting module **303** displays a message **1606** in FIG. **16**B on the operating unit **113** (step S**1514**). The message **1606** indicates that the IP address of the sub line matches with the IP address of the another apparatus on the network. As a result, the user is able to easily grasp that the IP address set for the sub line in the plural line mode matches with the IP address of the anther apparatus. Thereafter, the network setting module **303** terminates the present process.

[0083] In the process in FIG. **15** described above, different massages are displayed according to settings on the interface selection screen **800** when an error regarding the IP address of the MFP **101** occurs. Namely, an error message corresponding to a set infrastructure is displayed. Accordingly, the user is able to easily grasp that a defected IP address corresponds to an IP address of which line.

[0084] FIG. **17** is a flowchart showing a procedure of a sub line address information setting process carried out by the network setting module **303** appearing in FIG. **3**.

[0085] The process in FIG. **17** is carried out by the CPU **201** implementing a program stored in the HDD **205**, and carried out when the setting value indicative of the "wired (main)+wireless (sub) **803**" was selected is store in the HDD **205**, and the process in FIG. **14** was completed.

[0086] In FIG. **17**, the network setting module **303** carries out the above described communication connection process with an access point set on the wireless setting screen **1100**, for example, the access point **105** (step S**1701**). The network setting module **303** then determines whether the communication connection with the access point **105** was successful (step S**1702**).

[0087] As a result of the determination in step S**1702**, when the communication connection with the access point **105** was unsuccessful, the network setting module **303** terminates the present process. On the other hand, as a result of the determination in step S**1702**, when the communication connection with the access point **105** was successful, the network setting module **303** determines whether the DHCP is enabled based on the setting value set for the DHCP selection section **904** stored in the HDD **205** (step S**1703**).

[0088] As a result of the determination in step S**1703**, when the DHCP is disabled, the network setting module **303** carries out a process in step S**1705**, to be described later. On the other hand, as a result of the determination in step S**1703**, when the DHCP is enabled, the network setting module **303** obtains an IP address by the DHCP (step S**1704**). The network setting module **303** accesses to the DHCP server on the network of the sub line and obtains the IP address from the DHCP server. The network setting module **303** then decides the address information of the sub line of the MFP **101** (step S**1705**).

[0089] Subsequently, the network setting module **303** carries out the IP address verification process in FIG. **15** (step S**1706**). The network setting module **303** then sets the IP address and the subnet mask in the decided address information of the sub line to the TCP/IP control module **305** (step S**1707**) and terminates the present process.

[0090] FIG. **18** is a flowchart showing a procedure of a wireless access point mode starting process carried out by the network setting module **303** appearing in FIG. **3**.

[0091] The process in FIG. **18** is carried out by the CPU **201** implementing a program stored in the HDD **205**, and carried out when the user selects the start button **501** on the start setting screen **500**. In the process in FIG. **18**, it is assumed that address information for the wireless access point mode, specifically, an IP address and a subnet mask are allocated in advance.

[0092] In FIG. **18**, the network setting module **303** requests the WPA control module **306** to generate an SSID and a PSK of the MFP **101** as an access point (step S**1801**). The network setting module **303** then requests the WPA control module **306** to set the SSID and the PSK (step s**1802**). The network setting module **303** requests the WPA control module **306** to enable the wireless LAN device **207** to which the wireless access point mode is set (step S**1803**). The network setting module **303** then sets address information for the wireless access point mode. Specifically, the network setting module **303** sets an IP address and a subnet mask in the address information for the wireless access point mode to the TCP/IP control module **305** (step S**1804**). Accordingly, the MPF **101** is able to perform the Wireless Direct. Subsequently, the network setting module **303** terminates the present process.

[0093] FIG. **19** is a flowchart showing a procedure of a wireless access point mode ending process carried out by the network setting module **303** appearing in FIG. **3**.

[0094] The process in FIG. **19** is carried out by the CPU **201** implementing a program stored in the HDD **205**. The process in FIG. **19** is also carried out when the user selects the end button **503** on the setting information screen **502** while the MFP **101** is in the wireless access point mode.

[0095] In FIG. **19**, the network setting module **303** clears address information of the set wireless access point mode, specifically, the IP address and the subnet mask for the wireless access point mode (step S**1901**). The network setting module **303** then requests the WPA control module **306** to disable the wireless LAN device **207** set to the wireless access point mode (step S**1902**). Subsequently, the network setting module **303** terminates the present process.

[0096] It should be noted that in the present embodiment described above, a name of the main line may be replaced with a name such as a primary line and a priority line, and a name of the sub line may be replaced with a name such as a secondary line and an auxiliary line.

[0097] Moreover, in the present embodiment described above, a name of the line may be replaced with a name such as an infrastructure.

[0098] Furthermore, in the present embodiment described above, a configuration which realizes a plurality of lines by using a physically different plurality of network interfaces was explained. However, a configuration which realizes a

plurality of logical lines by using a single network interface may be applied to the present invention.

OTHER EMBODIMENTS

[0099] Embodiment(s) of the present invention can also be realized by a computer of a system or apparatus that reads out and executes computer executable instructions (e.g., one or more programs) recorded on a storage medium (which may also be referred to more fully as a 'non-transitory computer-readable storage medium') to perform the functions of one or more of the above-described embodiment(s) and/or that includes one or more circuits (e.g., application specific integrated circuit (ASIC)) for performing the functions of one or more of the above-described embodiment(s), and by a method performed by the computer of the system or apparatus by, for example, reading out and executing the computer executable instructions from the storage medium to perform the functions of one or more of the above-described embodiment(s) and/or controlling the one or more circuits to perform the functions of one or more of the above-described embodiment(s). The computer may comprise one or more processors (e.g., central processing unit (CPU), micro processing unit (MPU)) and may include a network of separate computers or separate processors to read out and execute the computer executable instructions. The computer executable instructions may be provided to the computer, for example, from a network or the storage medium. The storage medium may include, for example, one or more of a hard disk, a random-access memory (RAM), a read only memory (ROM), a storage of distributed computing systems, an optical disk (such as a compact disc (CD), digital versatile disc (DVD), or Blu-ray Disc (BD)™), a flash memory device, a memory card, and the like.

[0100] While the present invention has been described with reference to exemplary embodiments, it is to be understood that the invention is not limited to the disclosed exemplary embodiments. The scope of the following claims is to be accorded the broadest interpretation so as to encompass all such modifications and equivalent structures and functions.

[0101] This application claims the benefit of Japanese Patent Application No. 2017-137594, filed Jul. 14, 2017, which is hereby incorporated by reference herein in its entirety.

What is claimed is:

1. An information processing apparatus comprising:

a setting unit configured to set an interface to be enabled in the information processing apparatus in accordance with an instruction by a user; and

a notification unit configured to notify an error,

wherein the setting unit sets statuses of a wired interface and a wireless interface as any one of followings: enabling the wired interface without enabling the wireless interface, enabling the wireless interface without enabling the wired interface, and enabling both the wired interface and the wireless interface, and

the notification unit notifies an error corresponding to the setting set by the setting unit.

2. The information processing apparatus according to claim **1**,

wherein one of the wired interface and the wireless interface is used as a main line, and the other of the wired interface and the wireless interface is used as a sub line,

the main line uses a default gateway, and

the sub line does not use the default gateway.

3. The information processing apparatus according to claim **1**, further comprising a display unit configured to display a setting screen for prompting a user to select any one of three choices consisting of a first choice which enables the wired interface without enabling the wireless interface, a second choice which enables the wireless interface without enabling the wired interface, and a third choice which enables both the wired interface and the wireless interface,

wherein the setting unit sets the interface to be enabled in the information processing apparatus in accordance with a selection by the user on the setting screen.

4. The information processing apparatus according to claim **1**, wherein the information processing apparatus is a printing apparatus.

5. The information processing apparatus according to claim **1**,

wherein the setting unit determines whether a plural lines are enabled in the information processing apparatus, and

in a case where the setting unit determines that the plural lines are disabled, the notification unit notifies an error which prompts checking of address information of the interface to be enabled.

6. The information processing apparatus according to claim **1**,

wherein the setting unit determines whether address information of the interface to be enabled matches with address information of another apparatus on a network in which the information processing apparatus exists,

in a case where the setting unit determines that the address information of the interface to be enabled matches with the address information of the another apparatus, the notification unit notifies an error indicating that an overlap of the address information occurs.

7. A control method for an information processing apparatus, comprising:

a setting step of setting an interface to be enabled in the information processing apparatus in accordance with an instruction by a user; and

a notification step of notifying an error,

wherein the setting step sets statuses of a wired interface and a wireless interface as any one of followings: enabling the wired interface without enabling the wireless interface, enabling the wireless interface without enabling the wired interface, and enabling both the wired interface and the wireless interface, and

the notification step notifies an error corresponding to the setting set in the setting step.

8. A non-transitory computer-readable storage medium storing a program for causing a computer to execute a control method for an information processing apparatus, the control method comprising:

a setting step of setting an interface to be enabled in the information processing apparatus in accordance with an instruction by a user; and

a notification step of notifying an error,

wherein the setting step sets statuses of a wired interface and a wireless interface as any one of followings: enabling the wired interface without enabling the wireless interface, enabling the wireless interface without

enabling the wired interface, and enabling both the wired interface and the wireless interface, and

the notification step notifies an error corresponding to the setting set in the setting step.

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