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(54) **INFORMATION PROCESSING APPARATUS, COOPERATION SYSTEM AND COMPUTER READABLE MEDIUM**

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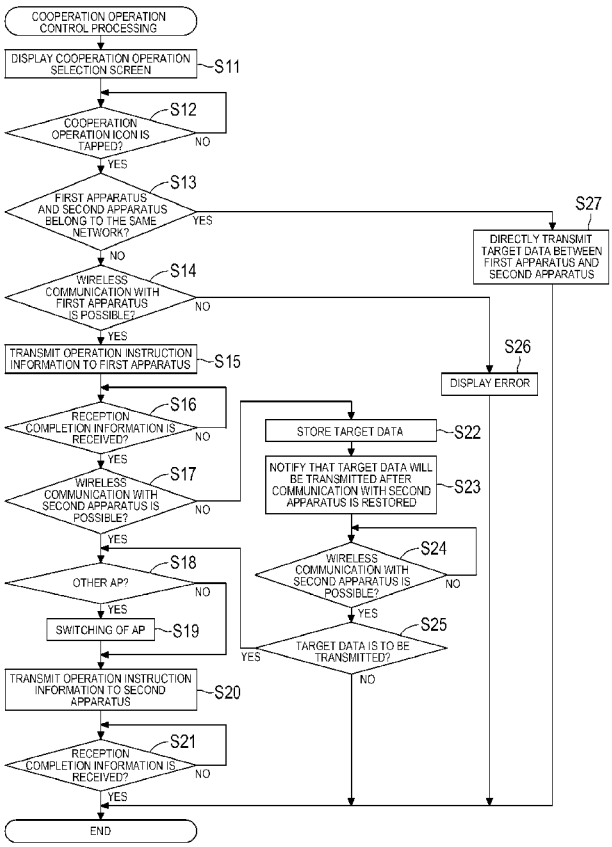
(57) **ABSTRACT**

An information processing apparatus configured to control a cooperation operation that is to be executed by a first apparatus and a second apparatus, executes: reception processing of receiving the target data from the first apparatus; first determination processing of determining whether the information processing apparatus can communicating with the second apparatus; storing control processing of storing the received target data in a storage unit when it is determined in the first determination processing that the communication unit is in a non-communicable state with the second apparatus; second determination processing of determining whether the information processing apparatus cannot communicate with the second apparatus, after executing the storing control processing; and transmission processing of wirelessly transmitting the target data stored in the storage unit to the second apparatus through the communication unit when the information processing apparatus can communicate with the second apparatus.



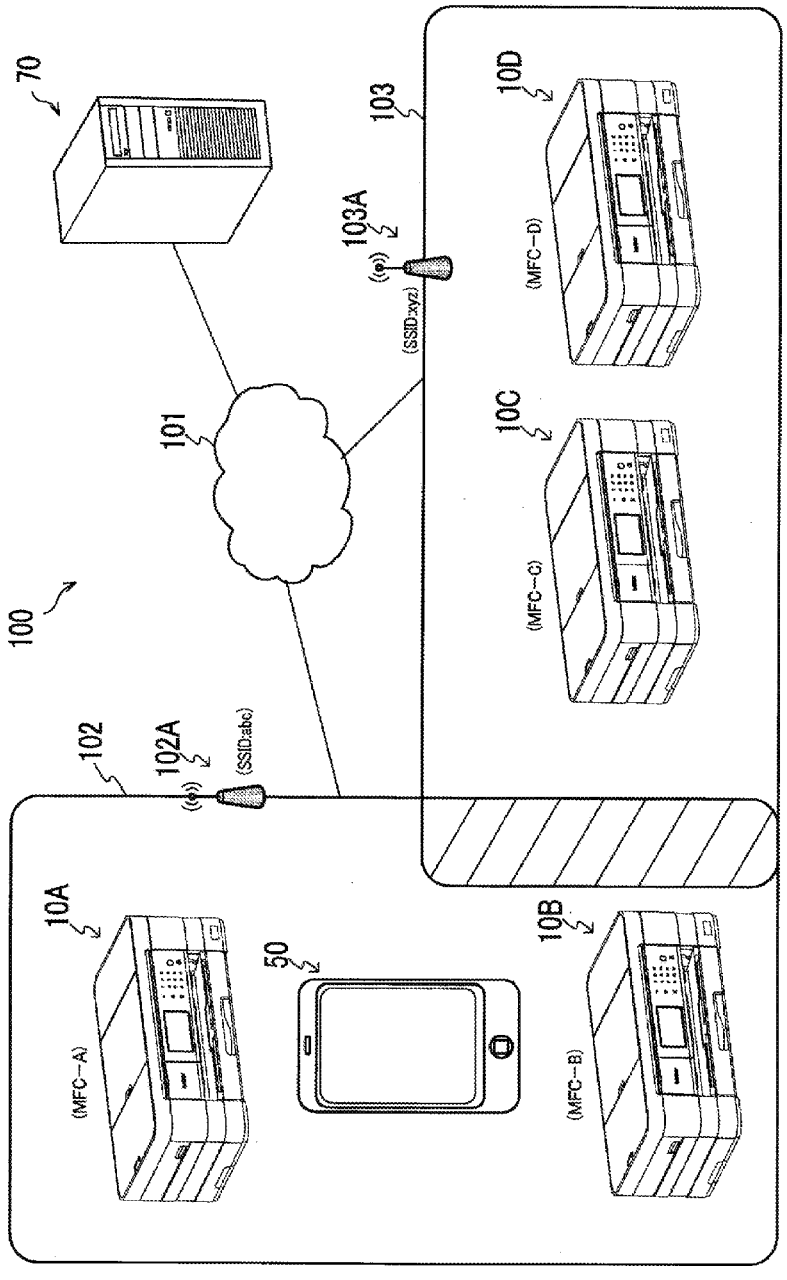

70
103
10D
(MFC-D)
103A
(SSID:xyz)
101
10C
(MFC-C)
100
102
102A
(SSID:abc)
10A
(MFC-A)
50
10B
(MFC-B)

FIG.1

FIG.2A

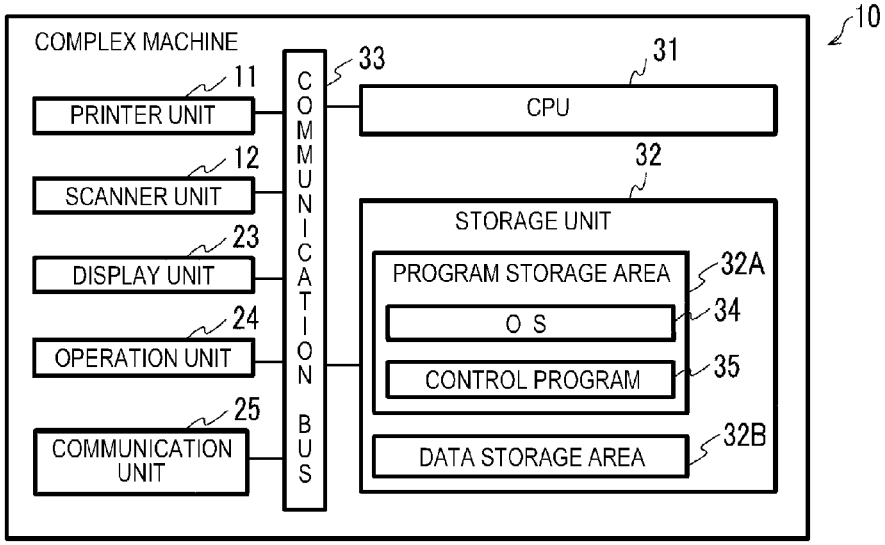

COMPLEX MACHINE
10
11
PRINTER UNIT
12
SCANNER UNIT
23
DISPLAY UNIT
24
OPERATION UNIT
25
COMMUNICATION UNIT
33
COMMUNICATION BUS
31
CPU
32
STORAGE UNIT
PROGRAM STORAGE AREA
32A
O S
34
CONTROL PROGRAM
35
DATA STORAGE AREA
32B

FIG.2B

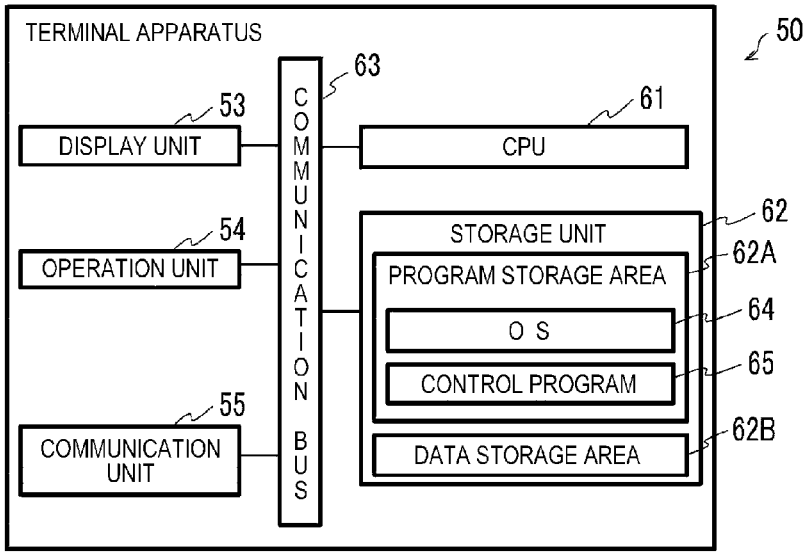

TERMINAL APPARATUS
50
53
DISPLAY UNIT
54
OPERATION UNIT
55
COMMUNICATION UNIT
63
COMMUNICATION BUS
61
CPU
62
STORAGE UNIT
62A
PROGRAM STORAGE AREA
64
O S
65
CONTROL PROGRAM
62B
DATA STORAGE AREA

FIG.3A

COOPERATION OPERATION ID	APPARATUS ID	OPERATION CONTENT	SSID
001	SERVER A	DL	—
	MFC−A	PRINT	abc

FIG.3B

COOPERATION OPERATION ID	APPARATUS ID	OPERATION CONTENT	SSID
002	MFC−A	SCAN	abc
	MFC−B	PRINT	abc

FIG.3C

APPARATUS ID	TARGET DATA

FIG.3D

APPARATUS ID	SSID	FIRST OPERATION	SECOND OPERATION
SERVER A	—	UL	—
MFC−A	abc	SCAN	PRINT
MFC−B	xyz	—	PRINT
・ ・	・ ・	・ ・	・ ・

FIG.4

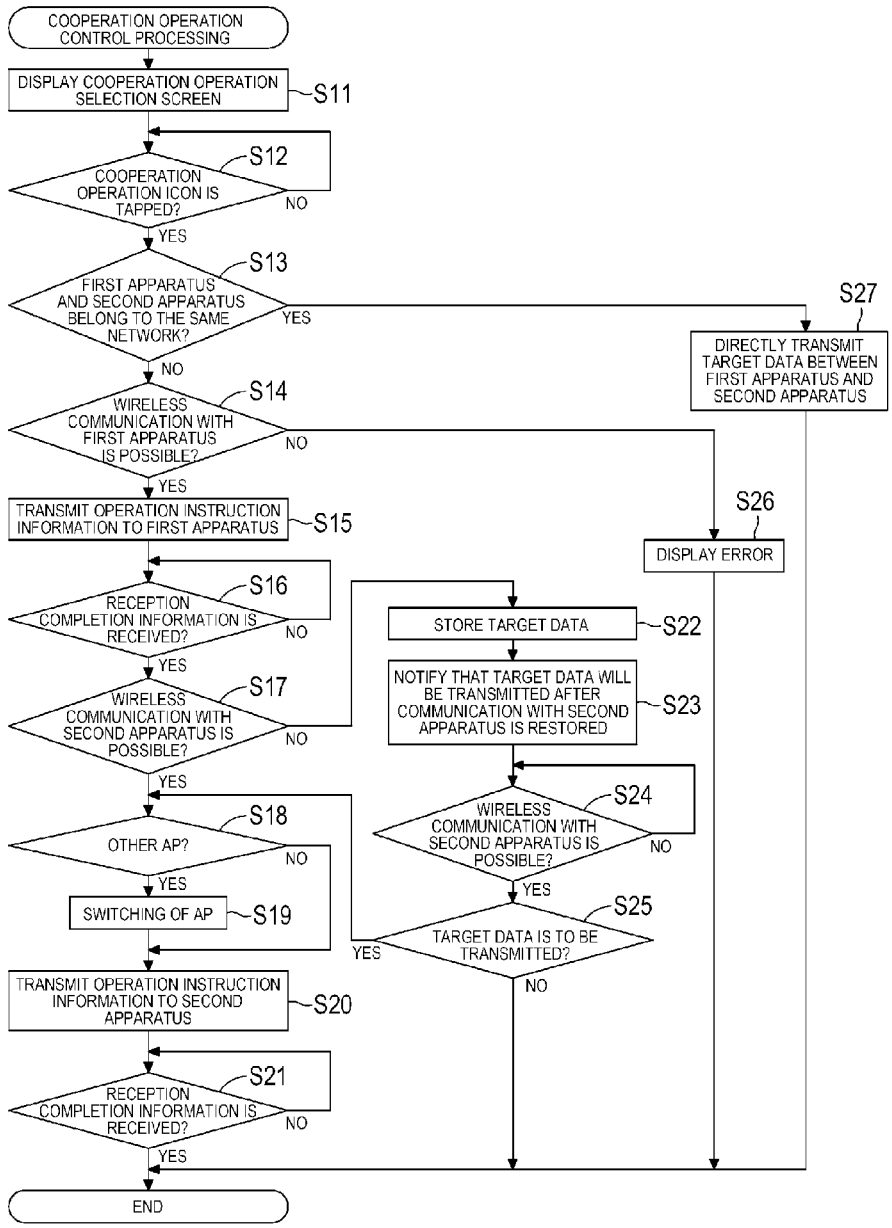

COOPERATION OPERATION CONTROL PROCESSING
DISPLAY COOPERATION OPERATION SELECTION SCREEN
S11
S12
COOPERATION OPERATION ICON IS TAPPED?
NO
YES
S13
FIRST APPARATUS AND SECOND APPARATUS BELONG TO THE SAME NETWORK?
YES
NO
S27
DIRECTLY TRANSMIT TARGET DATA BETWEEN FIRST APPARATUS AND SECOND APPARATUS
S14
WIRELESS COMMUNICATION WITH FIRST APPARATUS IS POSSIBLE?
NO
YES
S26
DISPLAY ERROR
TRANSMIT OPERATION INSTRUCTION INFORMATION TO FIRST APPARATUS
S15
S16
RECEPTION COMPLETION INFORMATION IS RECEIVED?
NO
YES
STORE TARGET DATA
S22
NOTIFY THAT TARGET DATA WILL BE TRANSMITTED AFTER COMMUNICATION WITH SECOND APPARATUS IS RESTORED
S23
S17
WIRELESS COMMUNICATION WITH SECOND APPARATUS IS POSSIBLE?
NO
YES
S24
WIRELESS COMMUNICATION WITH SECOND APPARATUS IS POSSIBLE?
NO
YES
S18
OTHER AP?
NO
YES
SWITCHING OF AP
S19
S25
TARGET DATA IS TO BE TRANSMITTED?
YES
NO
TRANSMIT OPERATION INSTRUCTION INFORMATION TO SECOND APPARATUS
S20
S21
RECEPTION COMPLETION INFORMATION IS RECEIVED?
NO
YES
END

FIG.5

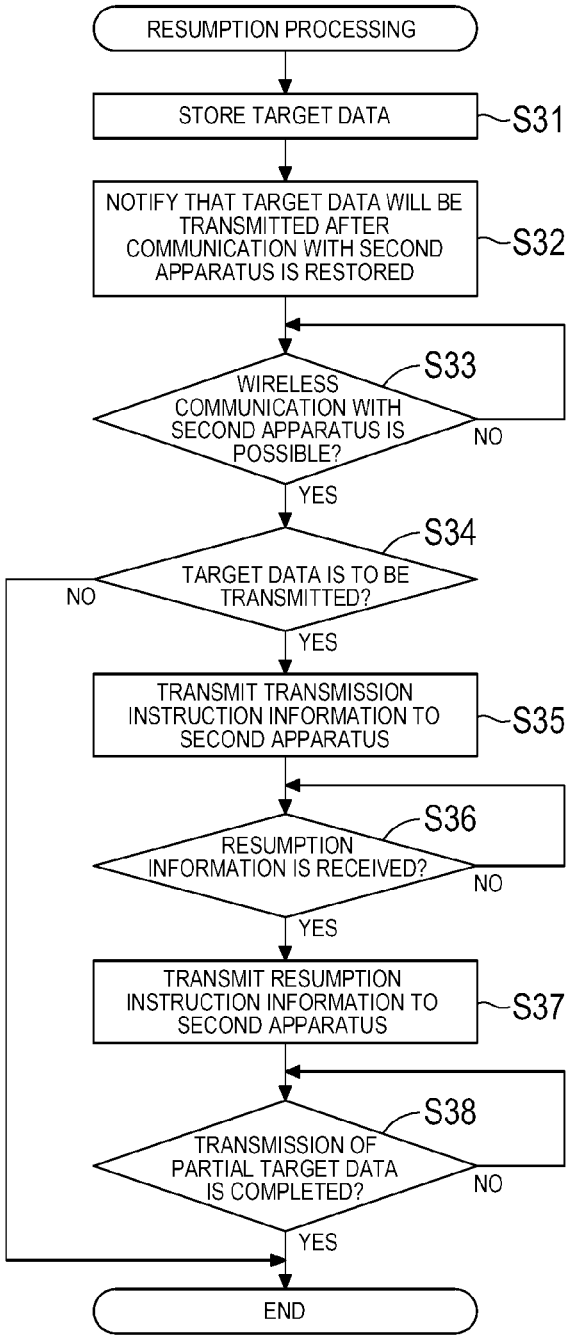

RESUMPTION PROCESSING
STORE TARGET DATA
S31
NOTIFY THAT TARGET DATA WILL BE TRANSMITTED AFTER COMMUNICATION WITH SECOND APPARATUS IS RESTORED
S32
S33
WIRELESS COMMUNICATION WITH SECOND APPARATUS IS POSSIBLE?
NO
YES
S34
TARGET DATA IS TO BE TRANSMITTED?
NO
YES
TRANSMIT TRANSMISSION INSTRUCTION INFORMATION TO SECOND APPARATUS
S35
S36
RESUMPTION INFORMATION IS RECEIVED?
NO
YES
TRANSMIT RESUMPTION INSTRUCTION INFORMATION TO SECOND APPARATUS
S37
S38
TRANSMISSION OF PARTIAL TARGET DATA IS COMPLETED?
NO
YES
END

FIG.6

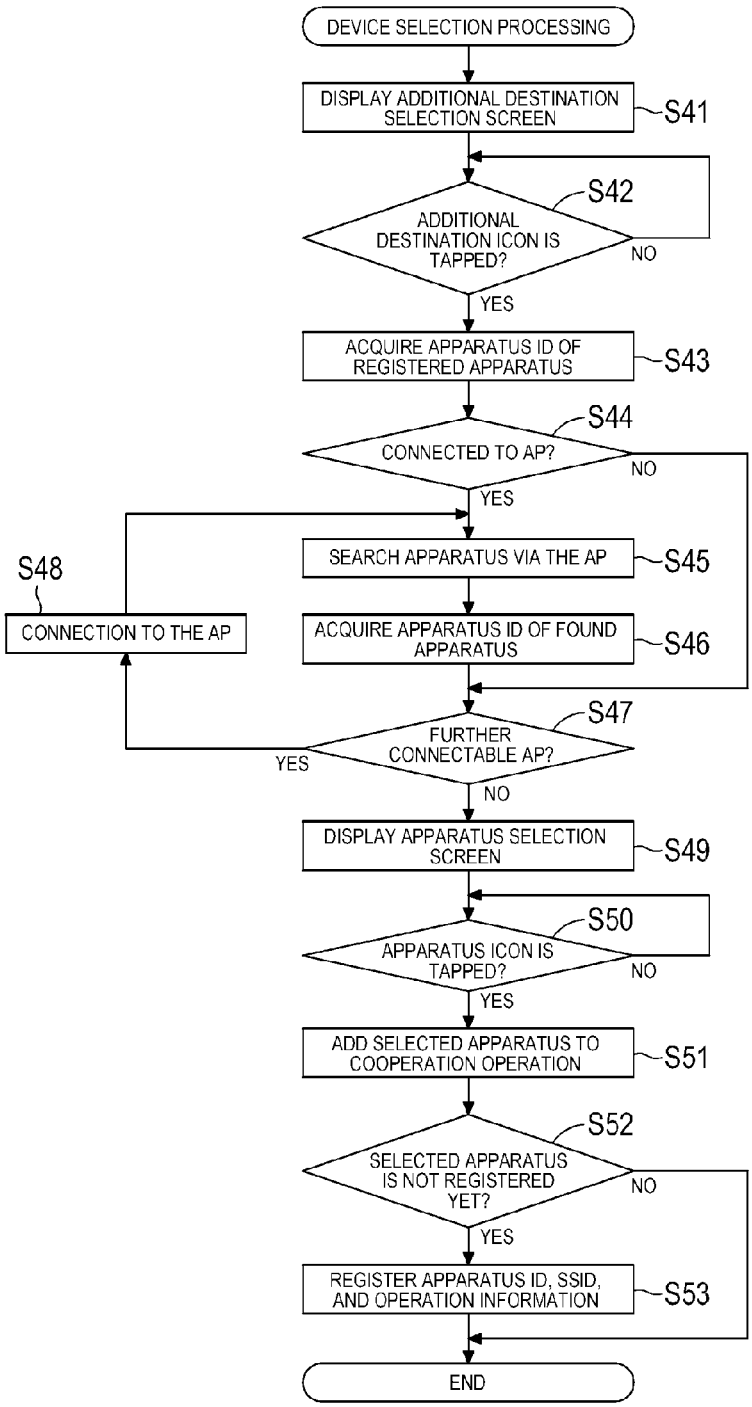

DEVICE SELECTION PROCESSING
DISPLAY ADDITIONAL DESTINATION SELECTION SCREEN
S41
S42
ADDITIONAL DESTINATION ICON IS TAPPED?
NO
YES
ACQUIRE APPARATUS ID OF REGISTERED APPARATUS
S43
S44
CONNECTED TO AP?
NO
YES
SEARCH APPARATUS VIA THE AP
S45
S48
CONNECTION TO THE AP
ACQUIRE APPARATUS ID OF FOUND APPARATUS
S46
S47
FURTHER CONNECTABLE AP?
YES
NO
DISPLAY APPARATUS SELECTION SCREEN
S49
S50
APPARATUS ICON IS TAPPED?
NO
YES
ADD SELECTED APPARATUS TO COOPERATION OPERATION
S51
S52
SELECTED APPARATUS IS NOT REGISTERED YET?
NO
YES
REGISTER APPARATUS ID, SSID, AND OPERATION INFORMATION
S53
END

FIG.7A

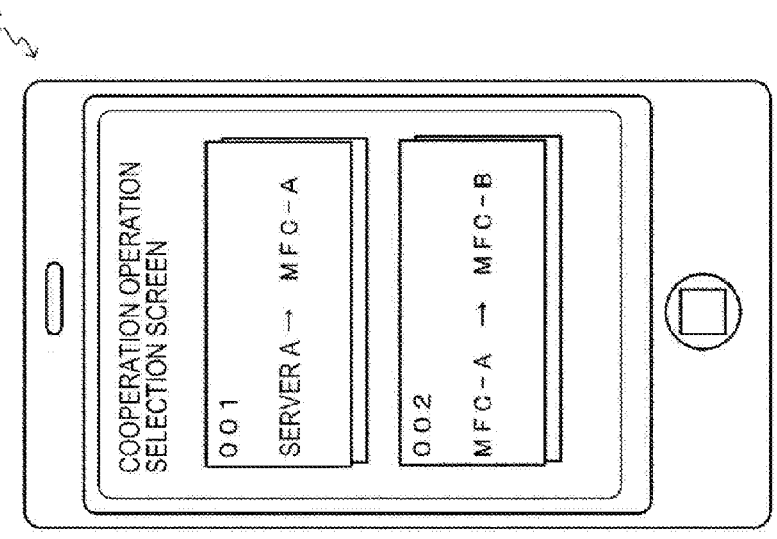

50
COOPERATION OPERATION SELECTION SCREEN
001
SERVER A → MFC-A
002
MFC-A → MFC-B

FIG.7B

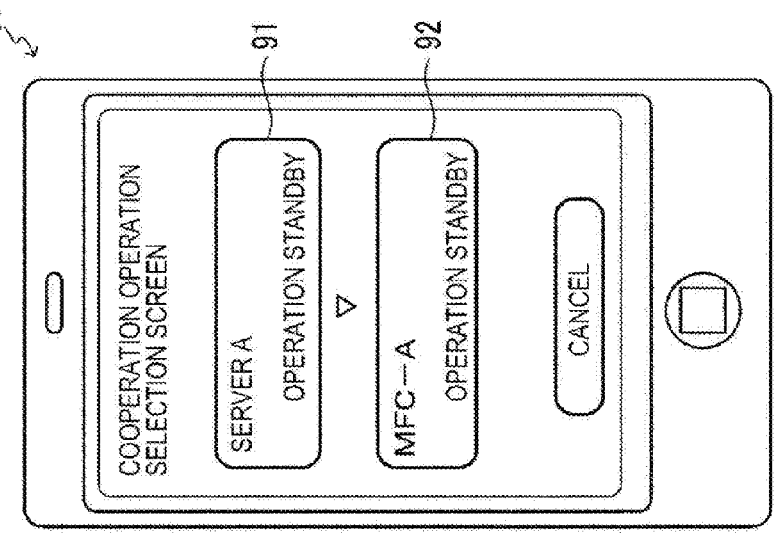

50
91
92
COOPERATION OPERATION SELECTION SCREEN
SERVER A
OPERATION STANDBY
MFC-A
OPERATION STANDBY
CANCEL

FIG.8A

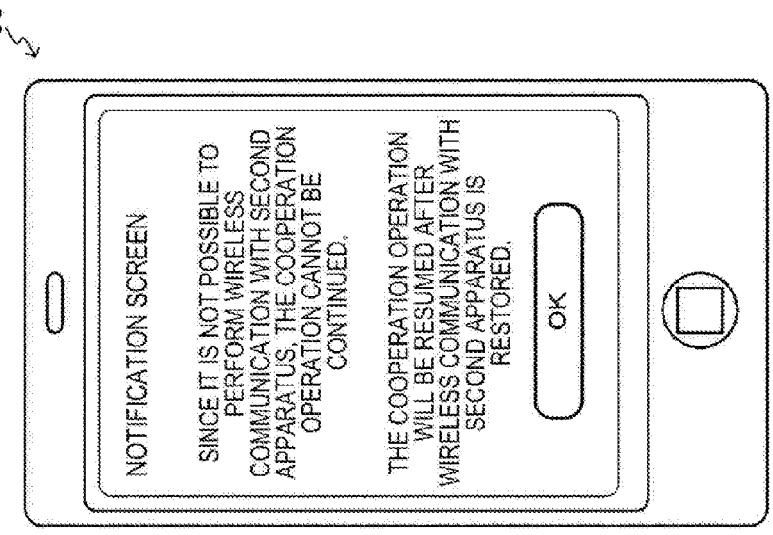

50
NOTIFICATION SCREEN
SINCE IT IS NOT POSSIBLE TO PERFORM WIRELESS COMMUNICATION WITH SECOND APPARATUS, THE COOPERATION OPERATION CANNOT BE CONTINUED.
THE COOPERATION OPERATION WILL BE RESUMED AFTER WIRELESS COMMUNICATION WITH SECOND APPARATUS IS RESTORED.
OK

FIG.8B

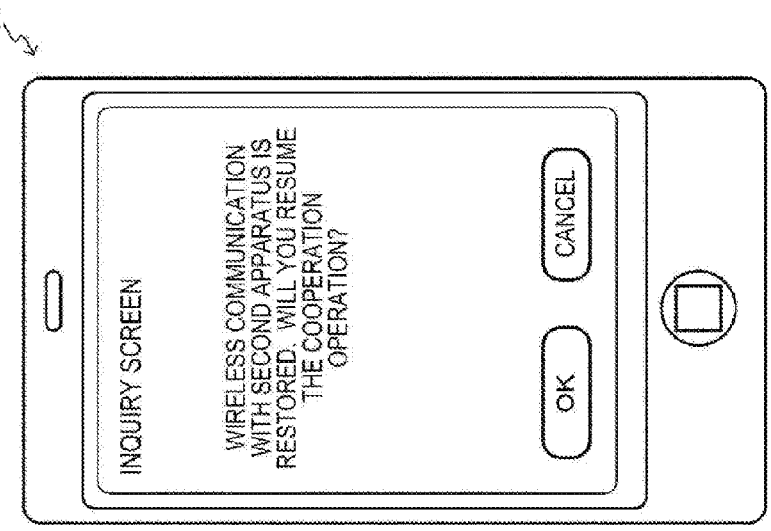

50
INQUIRY SCREEN
WIRELESS COMMUNICATION WITH SECOND APPARATUS IS RESTORED. WILL YOU RESUME THE COOPERATION OPERATION?
OK
CANCEL

FIG.9A

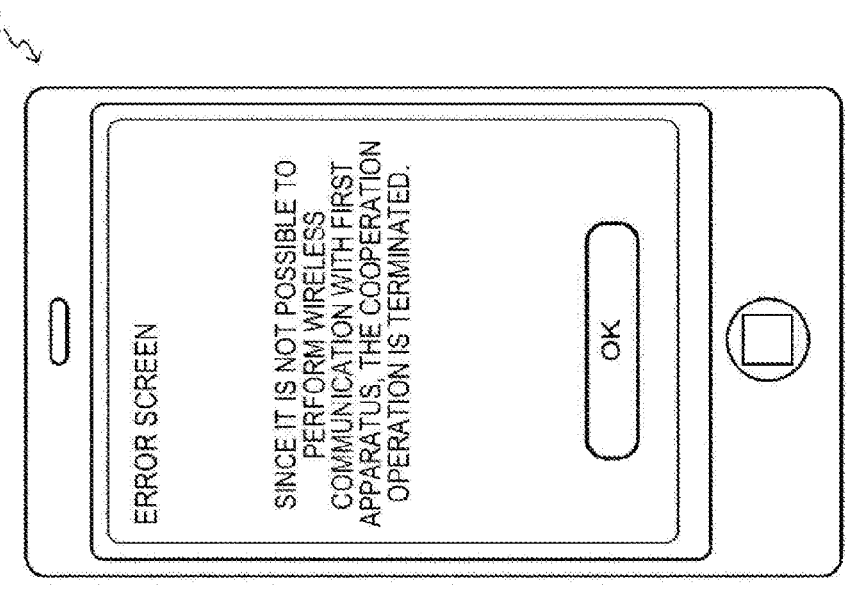

50
ERROR SCREEN
SINCE IT IS NOT POSSIBLE TO PERFORM WIRELESS COMMUNICATION WITH FIRST APPARATUS, THE COOPERATION OPERATION IS TERMINATED.
OK

FIG.9B

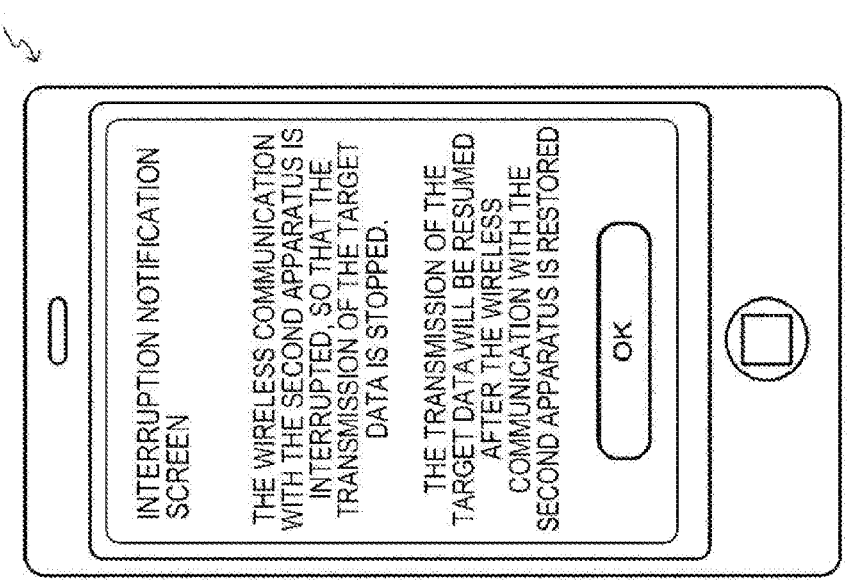

50
INTERRUPTION NOTIFICATION SCREEN
THE WIRELESS COMMUNICATION WITH THE SECOND APPARATUS IS INTERRUPTED, SO THAT THE TRANSMISSION OF THE TARGET DATA IS STOPPED.
THE TRANSMISSION OF THE TARGET DATA WILL BE RESUMED AFTER THE WIRELESS COMMUNICATION WITH THE SECOND APPARATUS IS RESTORED
OK

FIG.10A

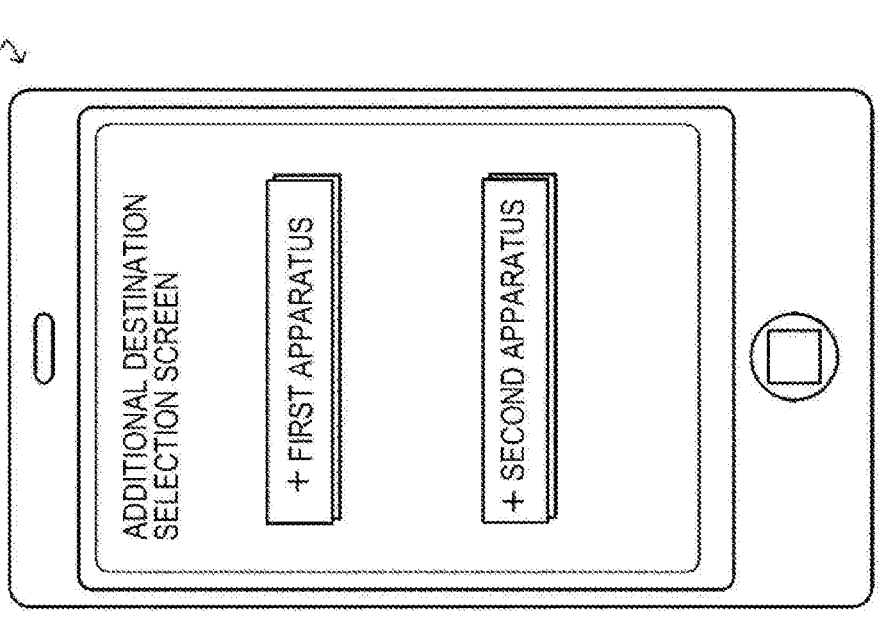
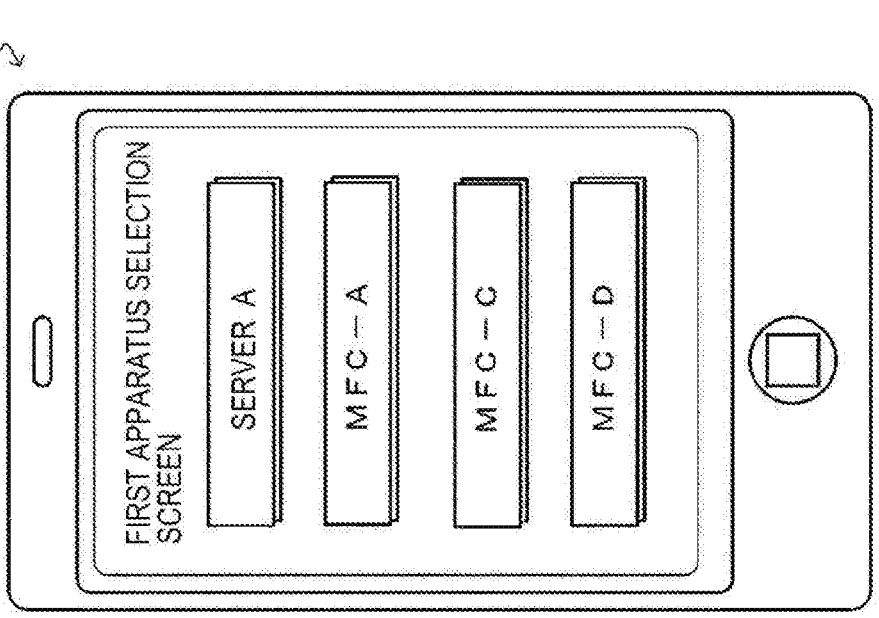


FIG.10B



INFORMATION PROCESSING APPARATUS, COOPERATION SYSTEM AND COMPUTER READABLE MEDIUM

CROSS REFERENCE TO RELATED APPLICATION

[0001] This application is a continuation of U.S. patent application Ser. No. 14/671,385 filed Mar. 27, 2015, which is based upon and claims the benefit of priority of Japanese Patent Application No. 2014-134926 filed on Jun. 30, 2014, the contents of which are incorporated herein by reference in their entirety.

BACKGROUND

[0002] The present disclosure relates to a program for operating a plurality of apparatuses in cooperation with each other.

[0003] In the related art, an information processing apparatus has been known which is configured to operate (hereinafter, referred to as 'cooperation operation') an input apparatus and an output apparatus selected from a plurality of devices connected to a network in cooperation with each other. The information processing apparatus is configured to download target data from a storage server, which is an example of the input apparatus, and to enable a printer, which is an example of the output apparatus, to record an image represented by the target data on a recording sheet.

[0004] It cannot be said that the information processing apparatus can always perform communication with both the input apparatus and the output apparatus during the cooperation operation. For this reason, for example, there is a possibility that even though the target data has been received from the input apparatus, the target data cannot be transmitted to the output apparatus. In this case, if the cooperation operation should be performed again from the first, a throughput of the cooperation operation is lowered and a user may be required to perform an unnecessary operation.

SUMMARY

[0005] It is therefore an object of one aspect of the present disclosure to provide a program capable of implementing a cooperation operation including processing of transmitting target data received from a first apparatus to a second apparatus without enabling a user to be conscious of a configuration of a communication network.

[0006] The aspect of the present disclosure provides the following arrangements:

[0007] A non-transitory computer readable recording medium storing a computer program for an information processing apparatus comprising a communication unit configured to perform wireless communication with a plurality of apparatuses through a communication network, an operation unit configured to receive a user's operation and a storage unit, the information processing apparatus being configured to control a cooperation operation that is to be executed by a first apparatus and a second apparatus selected from the plurality of apparatuses, wherein the cooperation operation causes the first apparatus to execute a first operation including transmitting target data to the information processing apparatus, and causes the second apparatus to execute a second operation including receiving the target data from the information processing apparatus after the first operation, the computer program when executed by a processor of the information processing apparatus causing the information processing apparatus to execute:

[0008] reception processing of wirelessly receiving the target data from the first apparatus in response to receiving by the operation unit a user's operation of inputting a start instruction to start the cooperation operation;

[0009] first determination processing of determining whether the communication unit is in a communicable state capable of wirelessly communicating with the second apparatus;

[0010] storing control processing of associating the received target data with apparatus identification information for identifying the second apparatus and storing the received target data in the storage unit when it is determined in the first determination processing that the communication unit is in a non-communicable state incapable of wirelessly communicating with the second apparatus;

[0011] second determination processing of determining whether the communication unit is in the communicable state with the second apparatus, after executing the storing control processing; and

[0012] transmission processing of wirelessly transmitting the target data stored in the storage unit in association with the apparatus identification information for identifying the second apparatus, to the second apparatus through the communication unit when it is determined in the second determination processing that the communication unit is in the communicable state with the second apparatus.

[0013] An information processing apparatus configured to control a cooperation operation that is to be executed by a first apparatus and a second apparatus, wherein the cooperation operation is to cause the first apparatus to execute a first operation including transmitting target data to the information processing apparatus, and is to cause the second apparatus to execute a second operation including receiving the target data from the information processing apparatus after the first operation, the information processing apparatus comprising:

[0014] a communication unit configured to perform wireless communication with the plurality of apparatuses through a communication network;

[0015] an operation unit configured to receive a user's operation;

[0016] a processor; and

[0017] a storage unit storing a computer readable program, when executed by the processor, causing the information processing apparatus to execute:

[0018] reception processing of wirelessly receiving the target data from the first apparatus in response to receiving by the operation unit a user's operation of inputting a start instruction to start the cooperation operation;

[0019] first determination processing of determining whether the first apparatus is in a communicable state capable of wirelessly communicating with the second apparatus;

[0020] storing control processing of associating the received target data with apparatus identification information for identifying the second apparatus and storing the received target data in the storage unit when it is determined in the first determination processing that the

communication unit is in a non-communicable state incapable of wirelessly communicating with the second apparatus;

[0021] second determination processing of determining whether the communication unit is in the communicable state with the second apparatus, after executing the storing control processing; and

[0022] transmission processing of wirelessly transmitting the target data stored in the storage unit in association with the apparatus identification information for identifying the second apparatus, to the second apparatus through the communication unit when it is determined in the second determination processing that the communication unit is in the communicable state with the second apparatus.

[0023] A cooperation system comprising:

[0024] a first apparatus;

[0025] a second apparatus; and

[0026] an information processing apparatus configured to control a cooperation operation that is to be executed by the first apparatus and the second apparatus, wherein the cooperation operation is to cause the first apparatus to execute a first operation including transmitting target data to the information processing apparatus, and is to cause the second apparatus to execute a second operation including receiving the target data from the information processing apparatus after the first operation,

[0027] wherein the information processing apparatus comprises:

[0028] a communication unit configured to perform wireless communication with the plurality of apparatuses through a communication network;

[0029] an operation unit configured to receive a user's operation;

[0030] a processor; and

[0031] a storage unit storing a computer readable program, when executed by the processor, causing the information processing apparatus to execute:

[0032] reception processing of wirelessly receiving the target data from the first apparatus in response to receiving by the operation unit a user's operation of inputting a start instruction to start the cooperation operation;

[0033] first determination processing of determining whether the first apparatus is in a communicable state capable of wirelessly communicating with the second apparatus;

[0034] storing control processing of associating the received target data with apparatus identification information for identifying the second apparatus and storing the received target data in the storage unit when it is determined in the first determination processing that the communication unit is in a non-communicable state incapable of communicating with the second apparatus;

[0035] second determination processing of determining whether the communication unit is in the communicable state with the second apparatus, after executing the storing control processing; and

[0036] transmission processing of wirelessly transmitting the target data stored in the storage unit in association with the apparatus identification information for identifying the second apparatus, to the second apparatus through the communication unit when it is determined in the second determination processing that the communication unit is in the communicable state with the second apparatus.

BRIEF DESCRIPTION OF DRAWINGS

[0037] FIG. **1** is a schematic view of a cooperation system **100** of an illustrative embodiment.

[0038] FIG. **2**A is a block diagram of a complex machine **10**, and FIG. **2**B is a block diagram of a portable terminal **50**.

[0039] FIG. **3**A to **3**D show examples of data to be stored in a data storage area **62**B, in which FIGS. **3**A and **3**B show a cooperation operation list, FIG. **3**C shows associated apparatus ID and target data, and FIG. **3**D shows associated apparatus ID, SSID, first operation and second operation.

[0040] FIG. **4** is a flowchart of cooperation operation control processing that is executed by a control program **65** of the portable terminal **50**.

[0041] FIG. **5** is a flowchart of resumption processing that is executed by the control program **65** of the portable terminal **50**.

[0042] FIG. **6** is a flowchart of device selection processing that is executed by the control program **65** of the portable terminal **50**.

[0043] FIGS. **7**A and **7**B illustrates display examples of a display unit **53**, in which FIG. **7**A illustrates a cooperation operation selection screen and FIG. **7**B illustrates a cooperation operation screen.

[0044] FIGS. **8**A and **8**B illustrates display examples of the display unit **53**, in which FIG. **8**A illustrates a notification screen and FIG. **8**B illustrates an inquiry screen.

[0045] FIGS. **9**A and **9**B illustrates display examples of the display unit **53**, in which FIG. **9**A illustrates an error screen and FIG. **9**B illustrates an interruption notification screen.

[0046] FIGS. **10**A and **10**B illustrates display examples of the display unit **53**, in which FIG. **10**A illustrates an additional destination selection screen and FIG. **10**B illustrates a first apparatus selection screen.

DESCRIPTION OF ILLUSTRATIVE EMBODIMENTS

[0047] Hereinafter, an illustrative embodiment of the present disclosure will be described with reference to the drawings. Meanwhile, the illustrative embodiment, which will be described later, is just an example of an aspect of the present disclosure, and the illustrative embodiment of the present disclosure can be appropriately changed without changing the gist of the present invention.

[0048] FIG. **1** is a schematic view of a cooperation system **100** of an illustrative embodiment. The cooperation system **100** shown in FIG. **1** includes one or more complex machines **10**A, **10**B, **10**C, **10**D (hereinafter, also collectively referred to as 'complex machine **10**'), a portable terminal **50**, and one or more server apparatuses **70**. The complex machines **10**A, **10**B, **10**C, **10**D, the portable terminal **50** and the server apparatus **70** are configured to perform communication with each other through a communication network. Although a specific example of the communication network is not particularly limited, the communication network of this illustrative embodiment includes the Internet **101**, and wireless LANs (abbreviation of Local Area Network) **102**, **103** connected to the Internet **101**.

[0049] In the example of FIG. **1**, the wireless LANs **102**, **103** are connected to the Internet **101** through routers (not shown) and the like. Also, the complex machines **10**A, **10**B belong to the wireless LAN **102**, the complex machines **10**C, **10**D belong to the wireless LAN **103**, and the server apparatus **70** is connected to the Internet **101**. Also, the portable terminal **50** may belong to any of the wireless LANs **102**, **103**. In the meantime, the description 'belonging to the wireless LAN **102**' means, for example, that a setting for belonging to the wireless LAN **102** is made for an apparatus, the apparatus can perform communication with another apparatus belonging to the wireless LAN **102**, more specifically, the same SSID (abbreviation of Service Set IDentifier) as an access point **102**A of the wireless LAN **102** is set for the apparatus and the apparatus is provided with a network address allotted to the wireless LAN **102**. The SSID is an example of the connection information for connecting a communication unit **55** to the wireless LANs **102**, **103**.

[0050] Also, in the example of FIG. **1**, the wireless LANs **102**, **103** are provided with access points **102**A, **103**A, respectively. The access points **102**A, **103**A are configured to repeatedly transmit beacon signals with a predetermined period. The beacon signals include the SSIDs set for the access points **102**A, **103**A. The complex machine **10** and portable terminal **50** having received the beacon signals transmitted from the access points **102**A, **103**A are connected to the access points **102**A, **103** by wirelessly transmitting connection requests to the access points **102**A, **103**A. In the meantime, since the details of the processing (hereinafter, referred to as 'connection processing') are well-known methods defined in IEEE **802.11** and the like, for example, the descriptions thereof are omitted.

[0051] In FIG. **1**, a frame denoted with a reference numeral **102** indicates an area in which the beacon signal transmitted from the access point **102**A can be received. Also a frame denoted with a reference numeral **103** indicates an area in which the beacon signal transmitted from the access point **103**A can be received. Further, a hatched area of FIG. **1** indicates an area in which the beacon signals transmitted from both the access points **102**A, **103**A can be received.

[0052] The complex machine **10** belonging to the wireless LAN **102** can perform wireless communication with the portable terminal **50** belonging to the wireless LAN **102** and the portable terminal **50** on the Internet **101**, via the access point **102**A. The portable terminal **50** belonging to the wireless LANs **102**, **103** can perform communication with the complex machines **10**A to **10**D belonging to the wireless LANs **102**, **103** and the server apparatus **70** on the Internet **101**, via the access points **102**A, **103**A.

[0053] In the meantime, the wireless communication via the access points **102**A, **103**A is not limited to the wireless communication that is performed in an entire area of a communication zone. That is, the description 'the portable terminal **50** wirelessly transmits or wirelessly receives information or data via the access points **102**A, **103**A' indicates that at least a wireless zone is preferably formed between the portable terminal **50** and the access point **102**A, **103**A. This is also the same for the complex machines **10**A to **10**D.

[0054] The complex machines **10**A, **10**B, **10**C, **10**D and the server apparatus **70** are allotted with apparatus IDs for uniquely identifying the respective apparatuses. In this illustrative embodiment, an apparatus ID of the complex machine **10**A is "MFC-A", an apparatus ID of the complex machine **10**B is "MFC-B", an apparatus ID of the complex machine **10**C is "MFC-C", an apparatus ID of the complex machine **10**D is "MFC-D", and an apparatus ID of the server apparatus **70** is "server A". The complex machines **10**A, **10**B, **10**C, **10**D and the server apparatus **70** are examples of the plurality of apparatuses. The apparatus ID is an example of the apparatus identification information.

[0055] The apparatus included in the cooperation system **100** is not limited to the complex machine **10** and the server apparatus **70**, and may be a dedicated machine such as a FAX apparatus, a printer, a 3D printer, a label printer, a sewing machine, a machine tool, a scanner, a camera and the like. In the meantime, the complex machine **10** and server apparatus **70** of the specific examples of the apparatus are examples of the apparatus that can be any of a first apparatus and a second apparatus, which will be described later. Also, the FAX apparatus, the scanner and the camera are examples of the apparatus that can be only the first apparatus. The printer, the 3D printer, the label printer, the sewing machine and the machine tool are examples of the apparatus that can be only the second apparatus.

Complex Machine **10**

[0056] As shown in FIG. **2**A, the complex machine **10** mainly has a printer unit **11**, a scanner unit **12**, a display unit **23**, an operation unit **24**, a communication unit **25**, a CPU (abbreviation of Central Processing Unit) **31**, a storage unit **32** and a communication bus **33**. The respective constitutional elements configuring the complex machine **10** are connected to each other via a communication bus **33**. The configurations of the complex machines **10**A, **10**B, **10**C may be common or may be partially different.

Printer Unit **11**, Scanner Unit **12**

[0057] The printer unit **11** is configured to execute recording processing of recording an image represented by image data onto a recording sheet. Although a recording method of the printer unit **11** is not particularly limited, a well-known method such as an inkjet method and an electrophotographic method may be adopted. The scanner unit **12** is configured to execute scan process of reading an image recorded on a recording sheet and generating image data. The complex machine **10** may further have a FAX function of transmitting and receiving facsimile data, a copy function of reading an image recorded on a recording sheet and recording the same onto another recording sheet, and the like.

Display Unit **23**

[0058] The display unit **23** has a display screen for displaying a variety of information. Although a specific configuration of the display unit **23** is not particularly limited, an LCD (abbreviation of Liquid Crystal Display), an OLED (abbreviation of Organic Electro-Luminescence Display) and the like may be adopted.

Operation Unit **24**

[0059] The operation unit **24** is configured to receive a user's operation of selecting an object displayed on the display screen of the display unit **23**. Specifically, the operation unit **24** has push buttons, for example, and is configured to output a variety of operation signals associated with the pressed push buttons to the CPU **31**. Further, the operation unit **24** may have a film-shaped touch sensor

superimposed on the display screen of the display unit **23**. That is, the display unit **23** may be configured as a touch panel display. As the touch sensor, a well-known method such as an electrostatic capacitance type, a resistance film type and the like may be adopted.

[0060] In the meantime, the term 'object' indicates an image that can be selected by a user's operation on the operation unit **24**. For example, the object is a character string displayed on the display unit **23**. When a direction key of the operation unit **24** is pressed, one of the objects may be highlighted, and when an enter button of the operation unit **24** is pressed, the highlighted object may be selected. As another example, when the operation unit **24** is configured as a touch panel, the object may be an icon, a button, a link and the like displayed on the display unit **23**, and the object displayed on a tap position may be selected.

Communication Unit **25**

[0061] The communication unit **25** is an interface for performing communication with an external apparatus through the communication network. In this illustrative embodiment, the communication unit **25** is configured to perform communication with an external apparatus, based on the TCP/IP (abbreviation of Transmission Control Protocol/Internet Protocol) protocol. That is, the complex machine **10** is configured to transmit a variety of information to the portable terminal **50** through the communication unit **25** and to receive a variety of data or information from the portable terminal **50** through the communication unit **25**.

CPU **31**

[0062] The CPU **31** is configured to control an entire operation of the complex machine **10**. The CPU **31** is configured to acquire and execute a variety of programs (which will be described later) from the storage unit **32**, based on the variety of information output from the operation unit **24** and the variety of information acquired from the external apparatus through the communication unit **25**. That is, the CPU **31** and the storage unit **32** configure an example of the control unit.

Storage Unit **32**

[0063] The storage unit **32** has a program storage area **32**A and a data storage area **32**B. The program storage area **32**A is configured to store therein an OS (abbreviation of Operating System) **34** and a control program **35**. In the meantime, the control program **35** may be a single program or a combination of a plurality of programs. The data storage area **32**B is configured to store therein data or information, which is required to execute the control program **35**.

[0064] In the meantime, the 'data' and 'information' in the specification have a common feature that 'data' and 'information' are bits or bit string, which can be handled by a computer. The term 'data' indicates that a semantic content represented by each bit can be handled by a computer without considering the semantic content. In contrast, the term 'information' indicates that an operation of the computer is branched by a semantic content represented by each bit. Further, the term 'instruction' indicates a control signal for urging an apparatus of a transmission destination to perform a next operation, and may include the information or may have a property as the information.

[0065] Also, the 'data' and 'information' are handled as the same data and information even though the formats (for example, a text format, a binary format, a flag format and the like) are changed for each computer, inasmuch as they are recognized as the same semantic content. For example, the information representing 'two' may be kept as information of a text format "0×32", which is the ASCII code, in one computer and may be kept as information of a binary format "10", which is the binary representation, in another computer.

[0066] Also, in the specification, the 'data' and 'information' before and after a predetermined calculation is applied thereto may be handled as the same data and information. For example, it is assumed that unencrypted key information is stored in the storage unit and encrypted key information (hereinafter, referred to as 'encrypted key information') is received through the communication unit **25**. In this case, when the key information stored in the storage unit coincides with decrypted key information obtained by decrypting the encrypted key information, the key information, the encrypted key information and the decrypted key information may be handled as the same 'key information'. In the meantime, the predetermined calculation is not limited to encryption/decryption and may be a calculation using a Hash function, for example.

[0067] However, the distinction of the 'data' and 'information' is not strict, and an exceptional handling is also allowed. For example, the data may be temporarily handled as the information, and the information may be temporarily handled as the data. Also, one that is handled as the data in an apparatus may be handed as the information in another apparatus. Further, the information may be extracted from the data, and the data may be extracted from the information.

[0068] The storage unit **32** is configured by a RAM (abbreviation of Random Access Memory), a ROM (abbreviation of Read Only Memory), an EEPROM (abbreviation of Electrically Erasable Programmable Read-Only Memory), an HDD (abbreviation of Hard Disk Drive), a buffer provided for the CPU **31** or a combination thereof.

[0069] In the meantime, the storage unit **32** may be a computer-readable storage medium. The computer-readable storage medium is a non-transitory medium. The non-transitory medium includes a recording medium such as a CD-ROM and a DVD-ROM, too. Also, the non-transitory medium is a tangible medium. In the meantime, an electric signal for carrying a program to be downloaded from a server and the like on the Internet is a computer-readable signal medium, which is one kind of the computer-readable medium, but is not included in the non-transitory computer-readable storage medium.

[0070] The program stored in the program storage area **32**A is configured to be executed by the CPU **31**. However, in the specification, the operations of each program may be described while omitting the CPU **31**. That is, in below descriptions, the description 'program A is configured to execute processing A' may indicate that 'CPU **31** is configured to execute processing A described in the program A'. This is also the same for the portable terminal **50** and server apparatus **70**, which will be described later.

[0071] The OS **34** is a basic program for providing an API (abbreviation of Application Programming Interface) configured to control the printer unit **11**, the scanner unit **12**, the display unit **23**, the operation unit **24**, the communication unit **25** and the like, which are the hardware configuring the

complex machine **10**. That is, each program described above is configured to call the API provided by the OS **34**, thereby controlling the respective hardware. However, in the specification, the operations of each program are described while omitting the OS **34**. That is, in below descriptions, the description 'program B is configured to control hardware C' may indicate that 'program B is configured to control hardware C through the API of the OS **34**'. This is also the same for the portable terminal **50** and server apparatus **70**, which will be described later.

Portable Terminal **50**

[0072] As shown in FIG. **2**B, the portable terminal **50** mainly has a display unit **53**, an operation unit **54**, a communication unit **55**, a CPU **61**, a storage unit **62** and a communication bus **63**. Since the display unit **53**, the operation unit **54**, the communication unit **55**, the CPU **61**, the storage unit **62** and the communication bus **63**, which are included in the portable terminal **50**, are common to the display unit **23**, the operation unit **24**, the communication unit **25**, the CPU **31**, the storage unit **32** and the communication bus **33**, which are included in the complex machine **10**, the overlapping descriptions are omitted. The CPU **61** and the storage unit **62** configure an example of the control unit. The portable terminal **50** is an example of the information processing apparatus. However, the specific example of the information processing apparatus is not limited to the portable terminal **50** such as a smart phone, a portable phone and a tablet terminal, and may be a PC (abbreviation of Personal Computer) and the like.

[0073] The communication unit **55** is configured to perform wireless communication with the complex machines **10**A, **10**B, **10**C, **10**D belonging to the wireless LANs **102**, **103** and to perform wireless communication with the server apparatus **70** on the Internet **101** via the access points **102**A, **103**A. That is, the portable terminal **50** is configured to wirelessly transmit a variety of data or information to the complex machine **10** or server apparatus **70** through the communication unit **55** and to wirelessly receive the variety of data or information from the complex machine **10** or server apparatus **70** through the communication unit **55**. Here, it is assumed that when the portable terminal **50** is arranged in the hatched area of FIG. **1**, the communication unit **55** of the portable terminal **50** can be connected to any of the access points **102**A, **103**A. However, the communication unit **55** cannot be connected to the access points **102**A, **103**A at the same time.

[0074] The data storage area **62**B of the storage unit **62** can store therein a cooperation operation list. The cooperation operation list is a list for defining a cooperation operation of causing a first apparatus to execute a first operation and a second apparatus to execute a second operation after the first operation. For example, as shown in FIGS. **3**A and **3**B, in the cooperation operation list, a first apparatus and a second apparatus selected from a plurality of apparatuses are associated with apparatus IDs for identifying the apparatuses, operation contents to be executed by the apparatuses and SSIDs for performing wireless communication with the apparatuses. The cooperation operation list is an example of the cooperation operation information.

[0075] The cooperation operation list shown in FIG. **3**A indicates that the server apparatus **70** identified with an apparatus ID "server A" is caused to execute a first operation "DL" and the complex machine **10**A identified with an apparatus ID "MFC-A" is caused to execute a second operation "PRINT". In FIG. **3**A, the server apparatus **70** is an example of the first apparatus, and the complex machine **10**A is an example of the second apparatus. Also, the cooperation operation list shown in FIG. **3**B indicates that the complex machine **10**A identified with an apparatus ID "MFC-A" is caused to execute a first operation "SCAN" and the complex machine **10**B identified with an apparatus ID "MFC-B" is caused to execute a second operation "PRINT". In FIG. **3**B, the complex machine **10**A is an example of the first apparatus, and the complex machine **10**B is an example of the second apparatus.

[0076] The operation content "DL" associated with the server apparatus **70** indicates a first operation of transmitting the target data stored in the server apparatus **70** to the portable terminal **50**. The operation content "SCAN" associated with the complex machine **10**A indicates a first operation of causing the scanner unit **12** to execute the scan processing and transmitting the target data generated in the scan processing to the portable terminal **50**. The operation content "PRINT" associated with the complex machines **10**A, **10**B indicates a second operation of receiving the target data from the portable terminal **50** and causing the printer unit **11** to execute recording processing of the target data. The first operation is an operation including the transmission of the target data to the portable terminal **50**. The second operation is an operation including the reception of the target data from the portable terminal **50**.

[0077] In the meantime, although not shown, the operation content included in the cooperation operation list may include more detailed content (hereinafter, referred to as 'setting information'). For example, the operation content "DL" may be added with a data ID of the target data, which is a downloading target, and the like. Also, the operation content "SCAN" may be added with a document size indicating a size of a document, information indicating a color scan or monochrome scan, information indicating a duplex scan or one-sided scan, and the like. Further, the operation content "PRINT" may be added with information indicating a size of a recording sheet, information indicating a number of the recording sheets, information indicating a number of images to be included on one recording sheet, information indicating a duplex print or one-sided print, and the like.

[0078] Regarding the SSID, the SSIDs set for the access points **102**A, **103**A of the wireless LANs **102**, **103** to which the corresponding apparatuses belong are set. That is, the complex machines **10**A, **10**B identified with the apparatus ID "MFC-A" and apparatus ID "MFC-B" are associated with the SSID "abc". In the meantime, the SSID corresponding to the server apparatus **70** on the Internet is blank.

[0079] The cooperation operation list can be arbitrarily prepared and edited by the user of the portable terminal **50**. The portable terminal **50** may receive new registration and editing of the cooperation operation list by the user through the display unit **53** and the operation unit **54**, for example. A specific using method of the new registration and editing of the cooperation operation list will be described later with reference to FIG. **6**. Also, a plurality of the cooperation operation lists can be stored in the data storage area **62**B. For this reason, the cooperation operation list stored in the data storage area **62**B is allotted with a cooperation operation ID for identifying the cooperation operation list. In this illustrative embodiment, the cooperation operation list shown in

FIG. **3**A is allotted with a cooperation operation ID "001" and the cooperation operation list shown in FIG. **3**B is allotted with a cooperation operation ID "002".

[0080] As shown in FIG. **3**C, the data storage area **62**B is configured to associate and store therein the apparatus ID and the target data. More specifically, the data storage area **62**B shown in FIG. **3**C is configured to associate and store therein the target data received from the first apparatus and the apparatus ID of the second apparatus, which is a transmission destination of the target data. In the meantime, the specific processing of storing the apparatus ID and target data in the data storage area **62**B shown in FIG. **3**C will be described later with reference to FIG. **4**.

[0081] Further, as shown in FIG. **3**D, the data storage area **62**B can associate and store therein the apparatus ID, the SSID, the first operation and the second operation. The SSID is SSIDs of the access points **102**A, **103**A of the wireless LANs **102**, **103** to which the apparatuses identified with the corresponding apparatus IDs belong. The first operation and second operation indicate operations that can be executed by an apparatus identified with the corresponding apparatus ID. Meanwhile, in this illustrative embodiment, it is assumed that an apparatus ID "server A" of the server apparatus **70** is already stored in the data storage area **62**B shown in FIG. **3**D at the time that the control program **65** is installed in the portable terminal **50**. In the meantime, the processing of storing the apparatus ID "MFC-A" and apparatus ID "MFC-B" in the data storage area **62**B shown in FIG. **3**D will be described later with reference to FIG. **6**.

Server Apparatus **70**

[0082] The server apparatus **70** is a storage server configured to store therein data, for example. Although the specific example of the server apparatus **70** is not particularly limited, the server apparatus **70** is an apparatus configured to provide services such as 'Dropbox (registered trademark)', 'Google Docs (registered trademark)', Tvernote (registered trademark)' and the like. Also, the present invention is not limited to the configuration where the server apparatus **70** is connected to the Internet **101**, and the server apparatus **70** may be a local storage server belonging to the wireless LANs **102**, **103**.

Cooperation Operation Control Processing

[0083] The cooperation operation control processing that is executed by the control program **65** of the portable terminal **50** is described with reference to FIG. **4**. The cooperation operation control processing is processing of, when it is not possible to perform wireless communication with the second apparatus, storing the target data received from the first apparatus in the data storage area **62**B, and when it becomes possible to perform wireless communication with the second apparatus, wirelessly transmitting the target data to the second apparatus. Meanwhile, in this illustrative embodiment, it is assumed that the portable terminal **50** is arranged in the hatched area of FIG. **1** and the communication unit **55** is connected to the access point **103**A.

[0084] First, the control program **65** of the portable terminal **50** displays a cooperation operation selection screen on the display unit **53** (S**11**). FIG. **7**A illustrates an example of the cooperation operation selection screen. The cooperation operation selection screen shown in FIG. **7**A includes cooperation operation icons indicating one or more cooperation operations stored in the data storage area **62**B. The cooperation operation icon is denoted with a cooperation operation ID for identifying the cooperation operation list stored in the data storage area **62**B.

[0085] Then, when the operation unit **54** receives a user's operation of tapping a position of the cooperation operation icon corresponding to the cooperation operation list shown in FIG. **3**A (S**12**: Yes), the control program **65** displays a cooperation operation screen on the display unit **53**. FIG. **7**B illustrates an example of the cooperation operation screen. The cooperation operation screen shown in FIG. **7**B includes status images **91**, **92** corresponding to the first apparatus and second apparatus included in the cooperation operation list, a cancel icon for receiving an instruction to stop the cooperation operation. The processing of step S**12** is an example of the reception processing of receiving a start instruction to start the cooperation operation.

[0086] In the status images **91**, **92**, the apparatus IDs included in the cooperation operation list and progressing statuses of operations that are executed by the apparatuses identified by the apparatus IDs are indicated. That is, the information indicated in the status images **91**, **92** is changed as the cooperation operation progresses. Also, the status images **91**, **92** are arranged in accordance with an execution sequence of the cooperation operation list. In the cooperation operation screen shown in FIG. **7**B, the status image **91** represents a progressing status of the first operation "DL" that is executed by the server apparatus **70** identified with the apparatus ID "server A". The status image **92** represents a progressing status of the second operation "PRINT" that is executed by the complex machine **10**A identified with the apparatus ID "MFC-A".

[0087] Then, the control program **65** determines whether the first apparatus and second apparatus registered in the cooperation operation list belong to the same communication network (S**13**). The control program **65** may determine whether the first apparatus and second apparatus belong to the same network by comparing the SSIDs of the cooperation operation list, for example. In this illustrative embodiment, the server apparatus **70**, which is the first apparatus, is arranged on the Internet **101**, and the complex machine **10**A, which is the second apparatus, belongs to the wireless LAN **102**. That is, in this illustrative embodiment, the first apparatus and the second apparatus belong to the different communication networks.

[0088] Then, when the server apparatus **70** and the complex machine **10**A belong to the different communication networks (S**13**: No), the control program **65** determines whether it is possible to perform wireless communication with the server apparatus **70** (S**14**). The case where it is possible to perform wireless communication with the server apparatus **70** on the Internet **101** is a case where it is possible to connect the communication unit **55** to the access points **102**A, **103**A of the wireless LANs **102**, **103** connected to the Internet **101**, for example. The case where it is possible to connect the communication unit **55** to the access points **102**A, **103**A is a case where the communication unit **55** can receive the beacon signals transmitted from the access points **102**A, **103**A.

[0089] That is, in step S**14**, the condition that the communication unit **55** is already connected to the access points **102**A, **103**A is not required, and a condition that the communication unit **55** is connected to the access points **102**A,

103A is preferably satisfied. This is also the same for steps S17, S24, which will be described later.

[0090] When it is determined that the communication unit 55 is not connected to any of the access points 102A, 103A yet and that the communication unit 55 can be connected to any one of the access points 102A, 103A, the control program 65 executes the above connection processing.

[0091] Then, when it is determined that it is possible to perform wireless communication with the server apparatus 70 (S14: Yes), the control program 65 wirelessly transmits operation instruction information to the server apparatus 70 through the communication unit 55 (S15). The operation instruction information is information for causing an apparatus of a transmission destination to execute a corresponding operation. The processing of step S15 and step S20, which will be described later, is an example of the operation instruction processing. Also, the control program 65 changes the progressing status of the status image 91 on the cooperation operation screen from "operation standby" to "being operating".

[0092] Then, the control program 65 holds execution of next processing and thereafter until transmission completion information is wirelessly received from the server apparatus 70 through the communication unit 55 (S16: No). Also, the control program 65 sequentially wirelessly receives the target data divided in plural from the server apparatus 70 through the communication unit 55 and stores the same in the data storage area 62B until the transmission completion information is wirelessly received from the server apparatus 70 through the communication unit 55 (S16: No). In the meantime, the target data described here may be stored in the RAM because it has only to store the target data only until the target data is completely received. The processing of wirelessly receiving the target data from the server apparatus 70 is an example of the reception processing.

[0093] The transmission completion information is information indicating the transmission completion of the target data to the portable terminal 50 of the first operation that is to be executed by the first apparatus. That is, when the transmission completion information is received from the first apparatus through the communication unit 55, the control program 65 determines that the target data is completely received from the first apparatus. Although the specific example of the transmission completion information is not particularly limited, it may be a packet in which "ON" is set in a FIN flag of a TCP header, for example.

[0094] Then, when the transmission completion information is received from the server apparatus 70 through the communication unit 55 (S16: Yes), the control program 65 determines whether it is possible to perform wireless communication with the complex machine 10A, which is the second apparatus (S17). The case where it is possible to perform wireless communication with the complex machine 10A belonging to the wireless LAN 102 is a case where the communication unit 55 can receive the beacon signal transmitted from the access point 102A, like step S14, for example. The processing of step S17 is an example of the first determination processing. Also, the control program 65 changes the progressing status of the status image 91 on the cooperation operation screen from "being operating" to "operation completed".

[0095] Then, when it is determined that it is possible to perform wireless communication with the complex machine 10 (S17: Yes), the control program 65 determines whether the access point 103A, to which the communication unit 55 is currently connected, is the same as the access point 102A of the wireless LAN 102 to which the complex machine 10A belongs (S18). When it is determined that the communication unit 55 is not connected to the access point 102A of the wireless LAN 102 to which the complex machine 10A belongs (S18: Yes), the control program 65 switches a connection destination of the communication unit 55 to the access point 102A (S19). On the other hand, when it is determined that the communication unit 55 is already connected to the access point 102A of the wireless LAN 102 to which the complex machine 10A belongs (S18: No), the control program 65 skips over step S19.

[0096] For example, in step S19, the control program 65 ends the connection between the communication unit 55 and the access point 103A, and wirelessly transmits a connection request, in response to the beacon signal transmitted from the access point 102A. Thereby, the connection destination of the communication unit 55 is switched from the access point 103A to the access point 102A. The processing of step S19, which is executed after the reception processing is completed (S16: Yes) and before the transmission processing starts (S20), is an example of the connection switching processing. Also, the wireless LAN 103 is an example of the first communication network, and the wireless LAN 102 is an example of the second communication network.

[0097] Then, the control program 65 wirelessly transmits the operation instruction information to the complex machine 10A through the communication unit 55 (S20).

[0098] Also, the control program 65 changes the progressing status of the status image 92 on the cooperation operation screen from "operation standby" to "being operating". Further, the control program 65 sequentially wirelessly transmits the target data divided in plural to the complex machine 10A through the communication unit 55 until the reception completion information is wirelessly received from the complex machine 10A through the communication unit 55 (S21: No). The processing of, when it is determined in step S17 that it is possible to perform wireless communication with the complex machine 10A, wirelessly transmitting the target data to the complex machine 10A is an example of the direct transmission processing.

[0099] The reception completion information is information indicating the reception completion of the target data from the portable terminal 50 of the second operation. That is, when the reception completion information is received from the complex machine 10A through the communication unit 55 (S21: Yes), the control program 65 determines that the transmission of the target data to the complex machine 10A is completed, and ends the cooperation operation control processing. Although the specific example of the reception completion information is not particularly limited, it may be a packet in which "ON" is set for a FIN flag and an ACK flag of the TCP header, for example.

[0100] When it is determined that it is not possible to perform wireless communication with the complex machine 10A, which is the second apparatus (S17: No), the control program 65 associates the target data received from the server apparatus 70 with the apparatus ID "MFC-A" of the complex machine 10A and stores the same in the data storage area 62B shown in FIG. 3C (S22). In the meantime, since it is necessary to continuously store the target data in step S22 until it is possible to perform wireless communication with the complex machine 10A, the target data is

preferably stored in the EEPROM, for example. The processing of step S22 is an example of the storing control processing. In the meantime, the case where the portable terminal 50 cannot perform wireless communication with the complex machine 10A is a case where the portable terminal 50 or complex machine 10A cannot connect to the access point 102A, a case where a power supply of the complex machine 10A is off, and the like.

[0101] Then, the control program 65 displays a notification screen on the display unit 53 (S23). FIG. 8A illustrates an example of the notification screen. The notification screen shown in FIG. 8A includes a message 'Since it is not possible to perform wireless communication with the second apparatus, the cooperation operation cannot be continues. The cooperation operation will be resumed after the wireless communication with the second apparatus is restored' and an OK icon. In the meantime, the method of notifying the message is not limited to the display on the display unit 53. For example, a guide sound may be output from a speaker (not shown) mounted to the portable terminal 50. The processing of step S23 is an example of the notification processing.

[0102] Then, when the operation unit 54 receives a user's operation of tapping a position of the OK button on the notification screen, the control program 65 holds execution of next processing and thereafter until it becomes possible to perform wireless communication with the complex machine 10A (S24). The determination of determining whether the portable terminal 50 and the complex machine 10A can perform wireless communication with each other may be common to step S17, for example. The processing of step S23, which is executed after the storing control processing (S22), is an example of the second determination processing.

[0103] When it becomes possible to perform wireless communication with the complex machine 10A (S24: Yes), the control program 65 asks the user whether to wirelessly transmit the target data stored in the data storage area 62B, which is shown in FIG. 3C, to the complex machine 10A through the communication unit 55 (S25). In step S25, the control program 65 may display an inquiry screen on the display unit 53, for example. FIG. 8B illustrates an example of the inquiry screen. The inquiry screen shown in FIG. 8B includes a message 'Wireless communication with the second apparatus is restored. Will you resume the cooperation operation?', an OK icon and a cancel icon. The processing of step S25 is an example of the inquiry processing.

[0104] Then, when the operation unit 54 receives a user's operation of tapping a position of the OK button on the inquiry screen (S25: Yes), the control program 65 executes processing of step S18 and thereafter. The processing of steps S18 to S21 is different from the above descriptions, in that the target data stored in the data storage area 62B in association with the apparatus ID "MFC-A" of the complex machine 10A is transmitted, and the others are common to the above descriptions. The tap located at the position of the OK button on the inquiry screen is an example of the execution instruction indicating the execution of the transmission processing. The processing of, when it is determined in step S24 that it is possible to perform wireless communication with the complex machine 10A, wirelessly transmitting the target data to the complex machine 10A, is an example of the transmission processing.

[0105] On the other hand, when the operation unit 54 receives a user's operation of tapping a position of the cancel icon on the inquiry screen (S25: No), the control program 65 ends the cooperation operation control processing. Also, when a time period for which the control program 65 stands by in step S24 until the processing is executed exceeds a threshold time period, the control program 65 may end the cooperation operation control processing. In the meantime, when ending the cooperation operation control processing, the control program 65 deletes the target data and apparatus ID stored in the data storage area 62B in step S22.

[0106] When it is not possible to perform wireless communication with the server apparatus 70 on the Internet 101 (S14: No), the control program 65 displays an error screen on the display unit 53 (S26). FIG. 9A illustrates an example of the error screen. The error screen shown in FIG. 9A includes a message 'Since it is not possible to perform wireless communication with the first apparatus, the cooperation operation is over.' and an OK icon. When the operation unit 54 receives a user's operation of tapping a position of the OK icon on the error screen, the control program 65 ends the cooperation operation control processing.

[0107] Further, when the operation unit 54 receives a user's operation of tapping the position of the cooperation operation icon corresponding to the cooperation operation list shown in FIG. 3B on the cooperation operation selection screen shown in FIG. 7A (S12: Yes), the control program 65 determines that the complex machine 10A and complex machine 10B registered in the cooperation operation list belong to the same communication network (S13: Yes). Then, the control program 65 causes the complex machine 10A to transmit the target data to the complex machine 10B (S27), and ends the cooperation operation control processing. The processing of step S26 is an example of the transmission and reception control processing.

[0108] In step S27, the control program 65 adds location information indicating a location of the complex machine 10B, which is a transmission destination of the target data, to the operation instruction information for causing the complex machine 10A to execute the first operation. Although the specific example of the location information is not particularly limited, it may be an IP address allotted to the complex machine 10B, for example. Thereby, the complex machine 10A, which is the first apparatus, transmits the target data generated by the first operation "SCAN" to the complex machine 10B through the communication unit 25. In the meantime, the complex machine 10B, which is the second apparatus, executes the second operation "PRINT", in response to the target data received from the complex machine 10A through the communication unit 25.

[0109] Meanwhile, the description 'the target data is transmitted from the complex machine 10A to the complex machine 10B in step S27' indicates that the target data is transmitted from the complex machine 10A to the complex machine 10B without via the portable terminal 50, for example, and the corresponding configuration does not limit a configuration where the access point 102A, a switching hub and the like are interposed between the complex machine 10A and the complex machine 10B. In other words, an IP address of the complex machine 10B included in the operation instruction information is preferably set in a transmission destination IP address of an IP packet including the target data, which is transmitted from the complex machine 10A. Also, at the time of step S27, when the communication unit 55 of the portable terminal 50 is not

connected to the access point **102**A of the wireless LAN **102** to which the complex machines **10**A, **10**B belong, the connection destination of the communication unit **55** is switched by the processing of step S**19**.

Resumption Processing

[0110] Subsequently, resumption processing that is executed by the control program **65** of the portable terminal **50** is described with reference to FIG. **5**. The resumption processing is processing of, when it is not possible to perform wireless communication with the second apparatus during the transmission of the target data, storing the target data in the data storage area **62**B, and when it is again possible to perform wireless communication with the second apparatus, resuming the transmission of the target data. In the meantime, the descriptions about the processing common to the cooperation operation control processing shown in FIG. **4** are omitted, and the differences are described.

[0111] In below descriptions, the cooperation operation is executed in accordance with the cooperation operation list shown in FIG. **3**A. Also, it is assumed that the target data includes a plurality of images to be recorded on each of a plurality of recording sheets. Further, it is assumed that the second operation "PRINT", which is executed by the complex machine **10**B, is to sequentially record a plurality of images represented by the target data on the recording sheets. The control program **65** of the portable terminal **50** executes the resumption processing shown in FIG. **5**, when it is not possible to perform wireless communication with the complex machine **10**B after the operation instruction information is transmitted to the complex machine **10**B through the communication unit **55** (S**20**) until the reception completion information is wirelessly received from the complex machine **10**B through the communication unit **55** (S**21**:No).

[0112] First, when it is not possible to perform wireless communication with the complex machine **10**B, the control program **65** associates the target data under transmission with the apparatus ID "MFC-B" of the complex machine **10**B, which is a transmission destination of the target data, and stores the same in the data storage area **62**B shown in FIG. **3**C (S**31**). The processing of step S**31** may be common to the processing of step S**22** shown in FIG. **4**, for example. That is, the processing of step S**31** is another example of the storing control processing.

[0113] Then, the control program **65** displays an interruption notification screen on the display unit **53** (S**32**). FIG. **9**B illustrates an example of the interruption notification screen. The interruption notification screen shown in FIG. **9**B includes a message 'The wireless communication with the second apparatus is interrupted, so that the transmission of the target data is stopped. The transmission of the target data will be resumed after the wireless communication with the second apparatus is restored' and an OK icon. The processing of step S**32** may be common to the processing of step S**23** shown in FIG. **4**, for example. That is, the processing of step S**32** is another example of the notification processing.

[0114] Then, when the operation unit **54** receives a user's operation of tapping a position of the OK icon on the interruption notification screen, the control program **65** holds execution of next processing and thereafter until it becomes possible to perform wireless communication with the complex machine **10**B (S**33**). The processing of step S**33** may be common to the processing of step S**24** shown in FIG. **4**, for example. That is, the processing of step S**33** is another example of the second determination processing.

[0115] Then, when it becomes possible to perform wireless communication with the complex machine **10**B (S**33**: Yes), the control program **65** asks the user whether or not to wirelessly transmit the target data stored in the data storage area **62**B shown in FIG. **3**C to the complex machine **10**B through the communication unit **55** (S**34**). The processing of step S**34** may be common to the processing of step S**25** shown in FIG. **4**, for example. That is, the processing of step S**34** is another example of the inquiry processing.

[0116] Then, when the operation unit **54** receives a user's operation of tapping a position of the OK icon on the inquiry screen (S**34**: Yes), the control program **65** wirelessly transmits transmission instruction information to the complex machine **10**B through the communication unit **55** (S**35**). The transmission instruction information is information for transmitting resumption information to the complex machine **10**B, which is a transmission destination. The resumption information is information for specifying a resumption image of a plurality of images, which is to be recorded on a next recording sheet. In the meantime, the resumption information may be any information inasmuch as it can specify a resumption image, for example, information for specifying an image finally recorded on the recording sheet. The processing of step S**35** is an example of the transmission instruction processing.

[0117] Then, when the resumption information is received from the complex machine **10**B through the communication unit **55** (S**36**: Yes), the control program **65** wirelessly transmits resumption instruction information to the complex machine **10**B through the communication unit **55** (S**37**). The resumption instruction information is information for resuming the operation interrupted in the apparatus of the transmission destination. Then, the control program **65** wirelessly transmits partial target data to the complex machine **10**B through the communication unit **55** (S**38**). The partial target data is data after the resumption image, which is represented by the resumption information, of the target data stored in the data storage area **62**B shown in FIG. **3**C in association with the apparatus ID "MFC-B". The processing of step S**38** is an example of the partial transmission processing.

[0118] When the transmission of the partial target data is completed (S**38**: Yes), the control program **65** ends the resumption processing. Also, when the operation unit **54** receives a user's operation of tapping a position of the cancel icon on the inquiry screen (S**34**: No), the control program **65** skips over steps S**34** to S**38** and ends the resumption processing. In the meantime, when ending the resumption processing, the control program **65** deletes the target data and apparatus ID stored in the data storage area **62**B in step S**31**.

Device Selection Processing

[0119] Subsequently, device selection processing that is executed by the control program **65** of the portable terminal **50** is described with reference to FIG. **6**. The device selection processing is processing of selecting the first apparatus and second apparatus which are to execute the cooperation operation. In other words, the device selection processing is processing of newly registering the cooperation operation list in the data storage area **62**B. When the operation unit **54** receives a user's operation of tapping a position of a 'new

registration' icon on a menu screen (not shown) displayed on the display unit **53**, the control program **65** executes the device selection processing shown in FIG. **6**.

[0120] First, the control program **65** displays an additional destination selection screen on the display unit **53** (S**41**). FIG. **10**A illustrates an example of the additional destination selection screen. The additional destination selection screen shown in FIG. **10**A includes a '+first apparatus' icon for receiving selection of the first apparatus and a '+second apparatus' icon for receiving selection of the second apparatus. Meanwhile, in FIG. **6**, the '+first apparatus' icon and '+second apparatus' icon are collectively denoted as 'additional destination icon'.

[0121] Then, when the operation unit **54** receives a user's operation of tapping a position of the '+first apparatus' icon on the additional destination selection screen (S**42**: Yes), the control program **65** acquires the apparatus ID of the apparatus IDs stored in the data storage area **62**B shown in FIG. **3**D, which is associated with the first operation (S**43**). In the meantime, in step S**43**, the control program **65** acquires the apparatus ID associated with the first operation, irrespective of whether the communication unit **55** is connected to the access point that can be connected with the SSID corresponding to the apparatus ID. In the example of FIG. **3**D, the apparatus ID "server A" and apparatus ID "MFC-A" associated with the first operation are acquired, and the apparatus ID "MFC-B" with which the first operation is not associated is not acquired.

[0122] Then, the control program **65** determines whether the communication unit **55** is connected to any one of the access points **102**A, **103**A (S**44**). When the communication unit **55** is already connected to the access point **102**A (S**44**: Yes), the control program **65** searches an apparatus capable of performing wireless communication through the access point **102**A, i.e., an apparatus belonging to the wireless LAN **102** (S**45**). Since the method of searching the apparatus in the wireless LAN **102** has been already well known, the descriptions thereof are omitted.

[0123] The control program **65** receives operation information, which indicates an operation that can be executed by the apparatus found in step S**45**, from the corresponding apparatus through the communication unit **55**. In the example of FIG. **1**, the complex machines **10**A, **10**B belonging to the wireless LAN **102** are found. Also, it is assumed that the operation information acquired from the complex machine **10**A indicates the first operation "SCAN" and the second operation "PRINT". Further, it is assumed that the operation information acquired from the complex machine **10**B indicates the second operation "PRINT".

[0124] Then, the control program **65** acquires an apparatus ID of the apparatus found in step S**45** (S**46**). At this time, the apparatus ID overlapping with the apparatus ID already acquired in step S**34** is excluded. That is, in this illustrative embodiment, an apparatus ID is not acquired through the apparatus search in the wireless LAN **102**. Also, when the communication unit **55** is not connected to any of the access points **102**A, **103**A upon the starting of the device selection processing (S**44**: No), the control program **65** skips over steps S**45**, S**46** and executes processing of step S**47**, which will be described later.

[0125] Then, the control program **65** determines whether there is a further connectable access point (S**47**). For example, in step S**47**, the control program **65** may determine whether it is possible to receive a beacon signal from the access point **103**A, which has not been connected yet, during the device selection processing. When it is possible to receive a beacon signal from the access point **103**A (S**47**: Yes), the control program **65** connects the communication unit **55** to the access point **103**A (S**48**), and again executes the processing of step S**45** and thereafter. The processing of step S**48** may be common to the processing of step S**19** shown in FIG. **4**.

[0126] In this illustrative embodiment, in steps S**45**, S**46** that are executed with the communication unit **55** being connected to the access point **103**A, the apparatus ID "MFC-C" of the complex machine **10**C and the apparatus ID "MFC-D" of the complex machine **10**D are acquired. Also, it is assumed that the operation information acquired from the complex machine **10**C, **10**D indicate the first operation "SCAN" and the second operation "PRINT". The control program **65** repeatedly executes the processing of steps S**45** to S**48** for all the connectable access points **102**A, **103**A. In other words, in steps S**45** to S**48** that are repeatedly executed, the control program **65** sequentially connects the communication unit **55** to each of the communication networks to search an apparatus belonging to each communication network. The processing of steps S**45** to S**48** is an example of the apparatus search processing.

[0127] Then, when there is no further connectable access point (S**47**: No), the control program **65** displays a first apparatus selection screen on the display unit **53** (S**49**). FIG. **10**B illustrates an example of the first apparatus selection screen. The first apparatus selection screen shown in FIG. **10**B includes one or more apparatus icons. Each apparatus icon is denoted with one apparatus ID acquired in steps S**43**, S**46**. The first apparatus selection screen shown in FIG. **10**B includes four apparatus icons denoted with the apparatus IDs "server A", "MFC-A", "MFC-C", "MFC-D".

[0128] Then, when the operation unit **54** receives a user's operation of tapping one position of the plurality of apparatus icons (S**50**: Yes), the control program **65** registers, in a new cooperation operation list, an apparatus ID denoted for the apparatus icon, a first operation represented by the operation information acquired from the apparatus identified with the apparatus ID, and an SSID for performing wireless communication with the apparatus identified with the apparatus ID. The processing of steps S**49** to S**51** is an example of the selection receiving processing of selecting the first apparatus and the second apparatus, which will be described later.

[0129] Meanwhile, in this illustrative embodiment, the SSIDs stored with being associated with the apparatus IDs "server A" and "MFC-A" in the cooperation operation list are stored in the data storage area **62**B shown in FIG. **3**D. Also, the SSIDs stored with being associated with the apparatus IDs "MFC-C", "MFC-D" in the cooperation operation list are the SSIDs of the access points to which the communication unit **55** is connected at the time that the apparatus IDs are found.

[0130] Then, when the apparatus selected in step S**50** has not been registered yet in the data storage area **62**B shown in FIG. **3**D (S**52**: Yes), the control program **65** stores the apparatus ID of the apparatus, the SSID, and the first operation and second operation represented by the operation information in the data storage area **62**B shown in FIG. **3**D (S**53**), and ends the device selection processing. The processing of step S**53** is an example of the registration processing. On the other hand, when the apparatus selected in

step S**50** has been already registered (S**52**: No), the control program **65** skips over step S**53**, and ends the device selection processing.

[0131] On the other hand, when a position of the '+second apparatus' icon on the additional destination selection screen is tapped, a list of apparatus IDs for identifying the apparatuses capable of executing the second operation is acquired in steps S**43** to S**48**. When a position of the apparatus icon denoted with the apparatus ID on the second apparatus selection screen is tapped, the second operation that can be executed by the apparatus ID is registered in the cooperation operation list. Further, when the selected apparatus ID has not been registered yet, the apparatus ID, the SSID, the first operation and the second operation are stored in the data storage area **62**B shown in FIG. **3**D. Since the processing of selecting the second apparatus to be included in the cooperation operation is common to the selection processing of the first apparatus, the detailed descriptions thereof are omitted.

Operational Effects of Illustrative Embodiment

[0132] According to the cooperation operation control processing of the above illustrative embodiment, it is possible to resume the cooperation operation, which has been interrupted because the wireless communication with the second apparatus could not be performed, as it becomes possible to perform wireless communication with the second apparatus. As a result, it is possible to execute the cooperation operation including the desired second apparatus, irrespective of whether it is possible to perform wireless communication at the present moment. That is, it is possible to execute the cooperation operation without making the user conscious about the configuration of the communication network.

[0133] According to the cooperation operation control processing, the user is notified or inquired at the interruption timing and resumption timing of the cooperation operation, so that it is possible to give the user an appropriate notification about the current situation and to allow the user to perform an appropriate operation. For example, it is possible to make the user recognized that the cooperation operation is resumed as it becomes possible to perform wireless communication with the second apparatus, through the notification processing of step S**23**. As a result, it is possible to suppress the user from performing an operation for restarting the cooperation operation from the beginning. As another example, the unnecessary cooperation operation is suppressed from resuming by the inquiry processing of step S**25**.

[0134] Also, according to the cooperation operation control processing, when the first apparatus and the second apparatus are connected to the same communication network, the target data is transmitted from the first apparatus to the second apparatus without via the portable terminal **50**. As a result, as compared to a configuration where the portable terminal **50** is configured to relay the target data, it is possible to improve the throughput of the cooperation operation and to reduce the processing load of the portable terminal **50**.

[0135] Meanwhile, in the cooperation operation control processing, the first determination processing is executed as the reception processing is completed. However, the execution timing of the first determination processing is not limited thereto. For example, the control program **65** may be configured to repeatedly execute the first determination processing at a predetermined time interval after the cooperation operation control processing starts until the reception processing is completed. Also, when it is determined in the first determination processing that it becomes possible to perform wireless communication with the second apparatus during the reception processing, the control program **65** may execute the reception processing and the direct transmission processing in parallel. That is, the control program **65** may be configured to transmit the target data stored in the RAM to the second apparatus without waiting for the completion of the reception processing. Thereby, the throughput of the cooperation operation is improved.

[0136] According to the resumption processing of the illustrative embodiment, the interrupted second operation is resumed in the middle of the operation. Thereby, it is possible to suppress the same image from being redundantly recorded on the plurality of recording sheets in the complex machine **10**A. Meanwhile, in the above illustrative embodiment, the resumption processing is executed in the cooperation operation including the second operation "PRINT". However, the second operation in which the resumption processing is executed is not limited thereto. For example, the resumption processing of FIG. **5** may be applied to a second operation of storing the target data received from the portable terminal **50** in the storage unit.

[0137] According to the device selection processing of the above illustrative embodiment, it is possible to select the desired first apparatus and second apparatus from the plurality of apparatuses, irrespective of the communication network to which the apparatuses belong or irrespective of whether it is possible to perform wireless communication with the portable terminal **50** at the present moment. That is, it is possible to allow the user to prepare the desired cooperation operation list without making the user conscious about the configuration of the communication network.

[0138] Meanwhile, in the above illustrative embodiment, the variety of programs stored in the program storage area **32**A, **62**A of the storage unit **32**, **62** of the complex machine **10** or portable terminal **50** are executed by the CPU **31**, **61**, so that the respective processing to be executed by the control unit of the present disclosure is implemented. However, the configuration of the control unit is not limited thereto, and a part or all of the configurations may be implemented by hardware such as IC (abbreviation of Integrated Circuit).

[0139] Further, the present invention can be implemented not only by the complex machine **10** or portable terminal **50** but also by a program configured to cause the complex machine **10** or portable terminal **50** to execute the processing. The program may be provided with being recorded in a non-transitory recording medium. The non-transitory recording medium may include a storage unit mounted to a server that can be connected to the complex machine **10** or portable terminal **50** through the communication network, in addition to a CD-ROM, a DVD-ROM and the like. The program stored in the storage unit of the server apparatus may be delivered through the communication network such as the Internet, as information or signal representing the program.

[0140] According to the above configuration, it is possible to resume the cooperation operation, which has been interrupted because the wireless communication with the second apparatus could not be performed, as it becomes possible to

perform wireless communication with the second apparatus. As a result, it is possible to execute the cooperation operation without enabling a user to be conscious of the configuration of the communication network. In the meantime, the storing control processing of storing the target data in the storage unit is different from the processing of temporarily storing the target data received from the first apparatus in a temporary memory.

[0141] According to the program described in the specification, it is possible to resume the cooperation operation in the middle of the operation, which has been interrupted because the wireless communication with the second apparatus could not be performed, as it becomes possible to perform wireless communication with the second apparatus. Therefore, it is possible to execute the cooperation operation without enabling the user to be conscious of the configuration of the communication network.

What is claimed is:

1. A non-transitory computer readable recording medium storing a computer program that, when executed by a processor of an information processing apparatus, causes the information processing apparatus to execute:

receiving, by an operation unit of the information processing apparatus, user input of a start instruction to start a cooperation operation, the cooperation operation configured to cause a first apparatus to transmit target data to the information processing apparatus, the information processing apparatus configured to wirelessly communicate with the first apparatus and a second apparatus through a communication network;

reception processing of wirelessly receiving the same target data transmitted from the first apparatus in the cooperation operation in response to receiving the user input of the start instruction;

first determination processing of determining whether a communication unit of the information processing apparatus is in a communicable state capable of wirelessly communicating with the second apparatus;

when it is determined in the first determination processing that the communication unit is in a non-communicable state incapable of wirelessly communicating with the second apparatus, storing control processing of:

associating, in a storage unit of the information processing apparatus, the received target data transmitted from the first apparatus in the cooperation operation with apparatus identification information for identifying the second apparatus; and

storing, in the storage unit, the received target data transmitted from the first apparatus in the cooperation operation in the storage unit;

after executing the storing control processing, second determination processing of determining whether the communication unit is in the communicable state with the second apparatus; and

when it is determined in the second determination processing that the communication unit is in the communicable state with the second apparatus after having stored the target data in the storage unit, transmission processing of wirelessly transmitting the same target data stored in the storage unit and previously transmitted from the first apparatus to the information processing apparatus in the cooperation operation, to the second apparatus through the communication unit.

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