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(12) **United States Patent**
**Yamamichi**

(10) **Patent No.: US 12,393,381 B2**
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(54) **INFORMATION PROCESSING APPARATUS, METHOD, AND NON-TRANSITORY COMPUTER-READABLE STORAGE MEDIUM STORING PROGRAM**

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(21) Appl. No.: **18/485,488**

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(65) **Prior Publication Data**

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(30) **Foreign Application Priority Data**

Oct. 21, 2022 (JP) ................................ 2022-169398

(51) **Int. Cl.**
***G06F 3/12*** (2006.01)

(52) **U.S. Cl.**
CPC .......... ***G06F 3/1254*** (2013.01); ***G06F 3/1204*** (2013.01); ***G06F 3/1255*** (2013.01); ***G06F 3/1288*** (2013.01)

(58) **Field of Classification Search**
None
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

| | | | | |
|---|---|---|---|---|
| 2014/0002836 A1* | 1/2014 | Ishino | .................. | G06F 3/1298<br>358/1.13 |
| 2021/0240412 A1* | 8/2021 | Saigusa | ................. | G06F 3/1288 |

FOREIGN PATENT DOCUMENTS

| | | | |
|---|---|---|---|
| JP | 2021124791 A1 | 8/2021 | |

* cited by examiner

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(57) **ABSTRACT**

An information processing apparatus includes an application which extends a function of a driver supporting a cloud print service. The application includes: a first acquisition unit which acquires capability information of a printer corresponding to the driver from the cloud print service if printing via the driver is performed; a display unit which displays a setting screen corresponding to the capability information based on the capability information acquired by the first acquisition unit; a second acquisition unit which acquires intermediate data generated by software different from the application based on setting information of the setting screen; and a conversion unit which converts the intermediate data acquired by the second acquisition unit into data to be transmitted to the cloud print service.

**19 Claims, 23 Drawing Sheets**

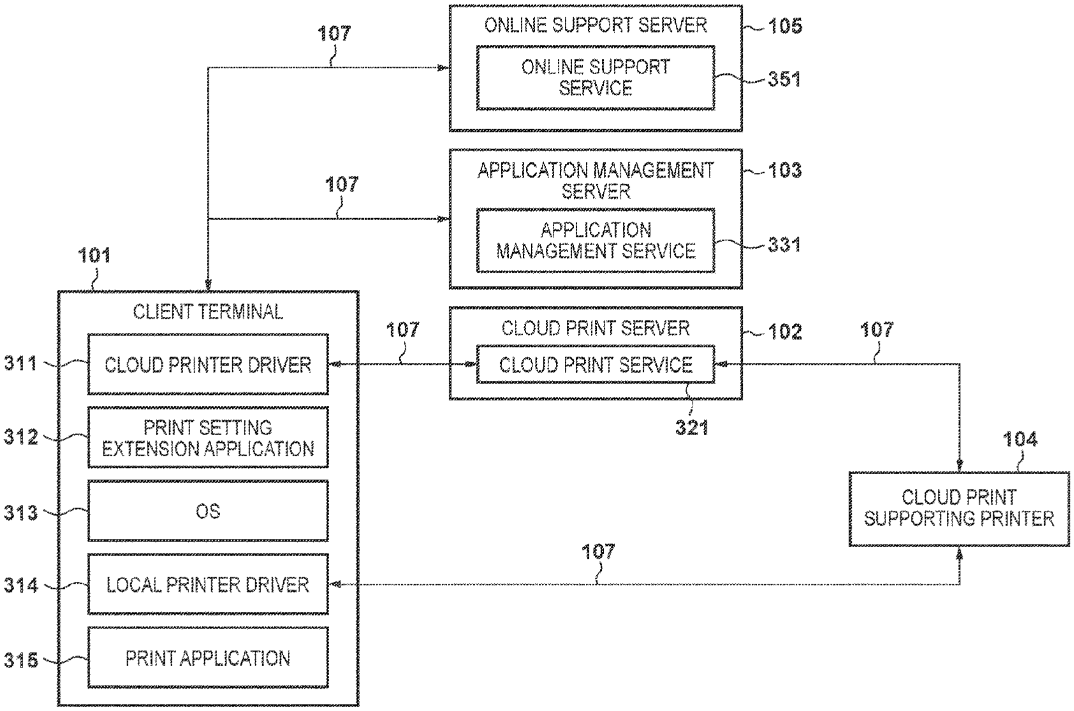


FIG. 1

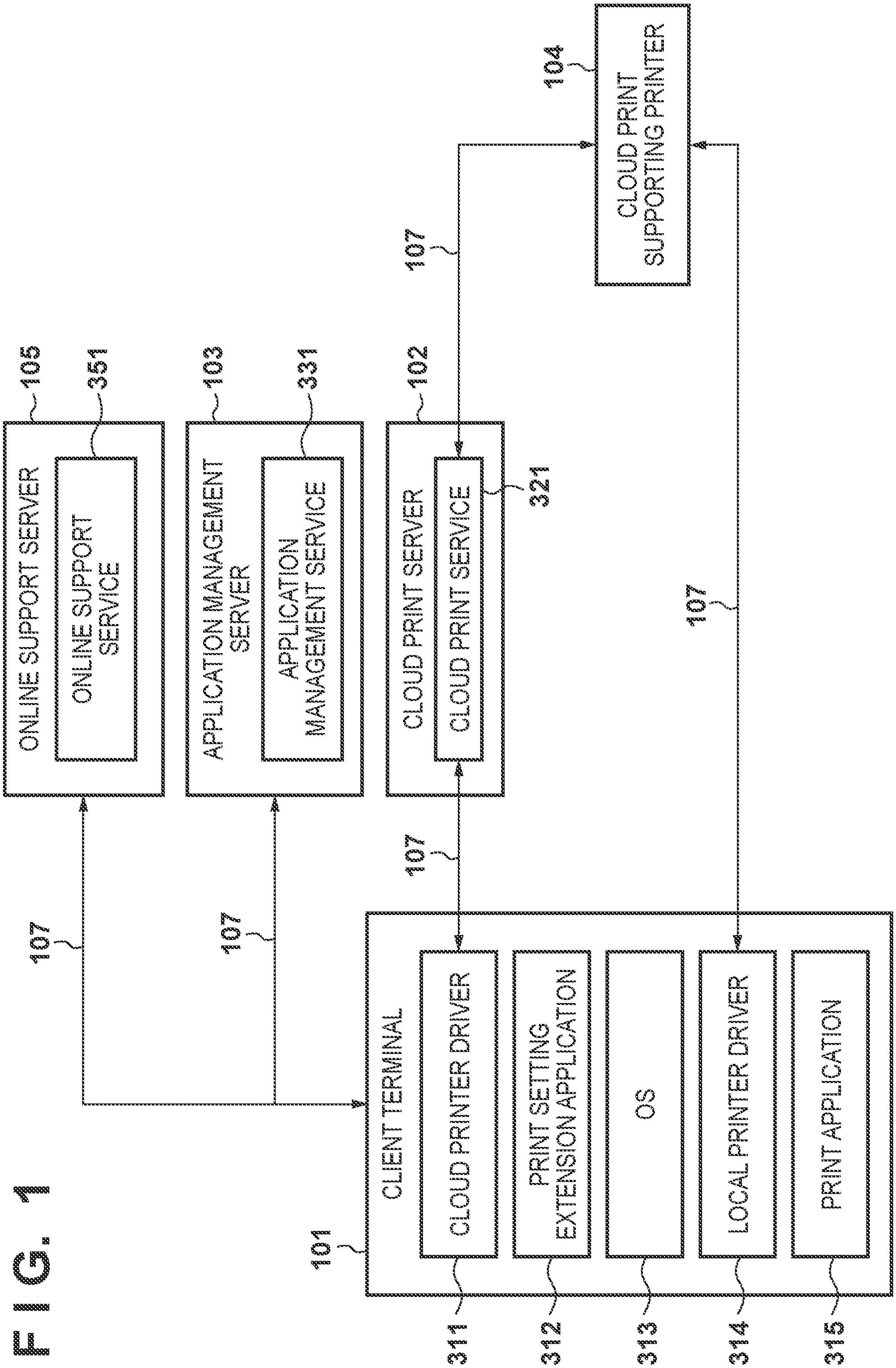

101
CLIENT TERMINAL
311
CLOUD PRINTER DRIVER
312
PRINT SETTING EXTENSION APPLICATION
313
OS
314
LOCAL PRINTER DRIVER
315
PRINT APPLICATION
105
ONLINE SUPPORT SERVER
351
ONLINE SUPPORT SERVICE
103
APPLICATION MANAGEMENT SERVER
331
APPLICATION MANAGEMENT SERVICE
102
CLOUD PRINT SERVER
321
CLOUD PRINT SERVICE
104
CLOUD PRINT SUPPORTING PRINTER
107
107
107
107
107

FIG. 2A

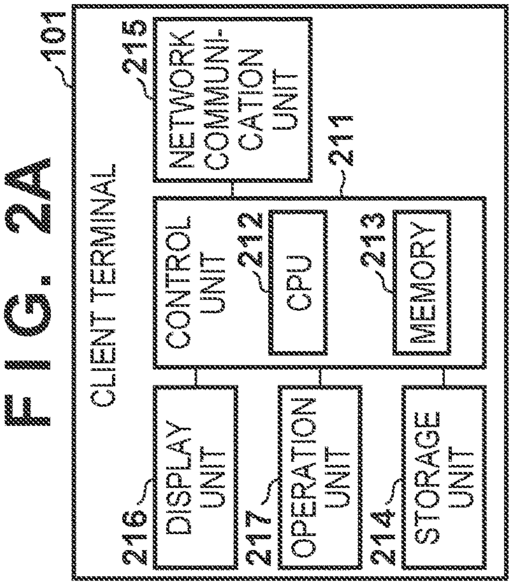


FIG. 2B

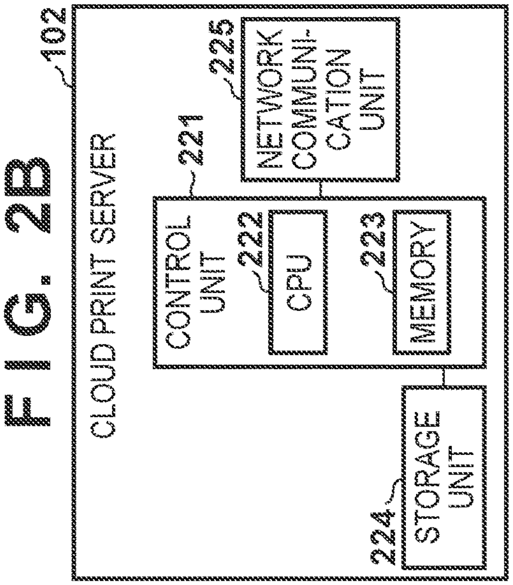


FIG. 2C

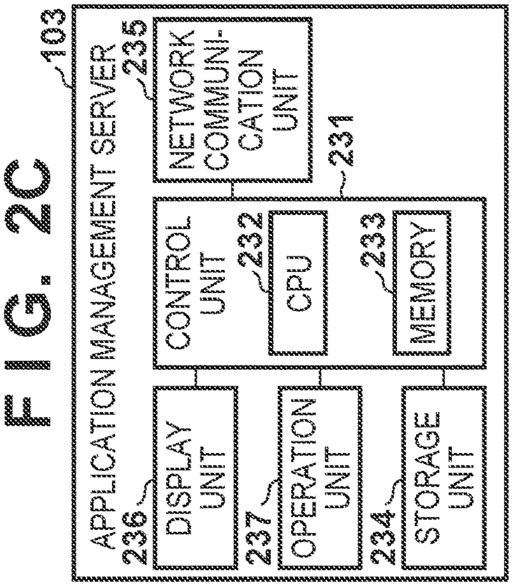


FIG. 2D

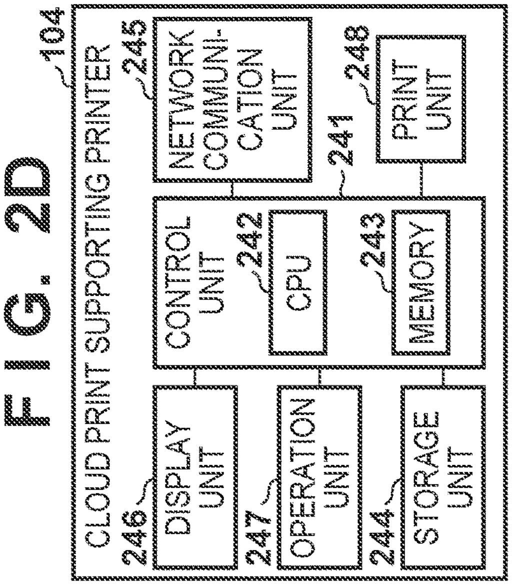


FIG. 2E

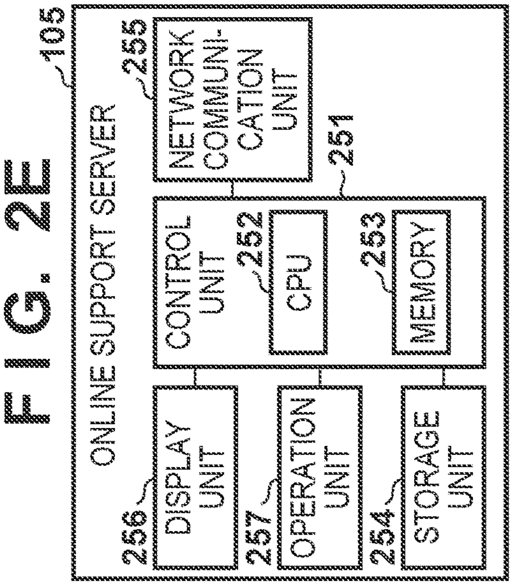


FIG. 3A

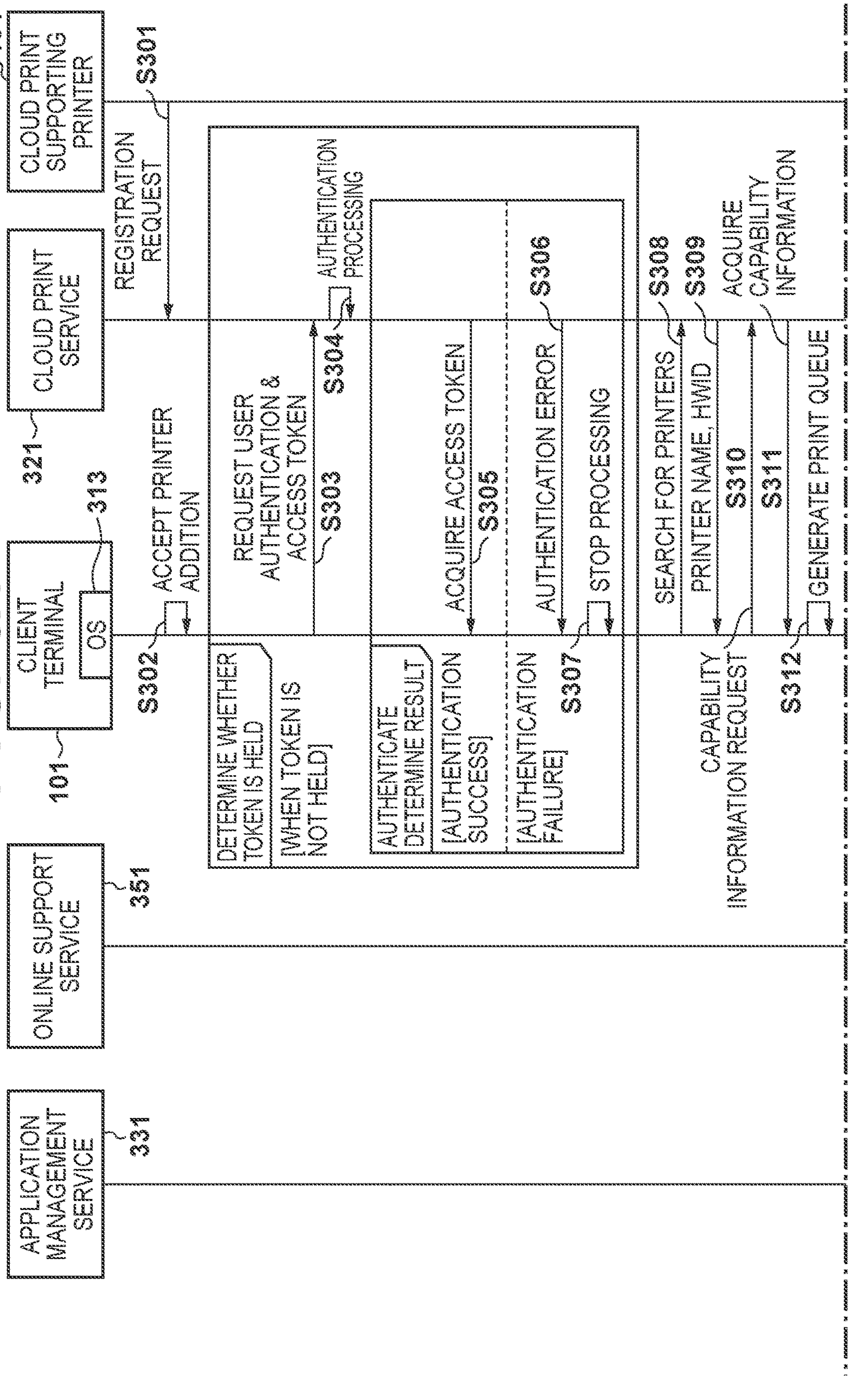

APPLICATION MANAGEMENT SERVICE
331
ONLINE SUPPORT SERVICE
351
CLIENT TERMINAL
OS
101
313
CLOUD PRINT SERVICE
321
CLOUD PRINT SUPPORTING PRINTER
104
S301
REGISTRATION REQUEST
S302
ACCEPT PRINTER ADDITION
DETERMINE WHETHER TOKEN IS HELD
[WHEN TOKEN IS NOT HELD]
REQUEST USER AUTHENTICATION & ACCESS TOKEN
S303
S304
AUTHENTICATION PROCESSING
AUTHENTICATE DETERMINE RESULT
[AUTHENTICATION SUCCESS]
ACQUIRE ACCESS TOKEN
S305
[AUTHENTICATION FAILURE]
AUTHENTICATION ERROR
S306
S307
STOP PROCESSING
S308
SEARCH FOR PRINTERS
S309
PRINTER NAME, HWID
S310
CAPABILITY INFORMATION REQUEST
S311
ACQUIRE CAPABILITY INFORMATION
S312
GENERATE PRINT QUEUE

FIG. 3B

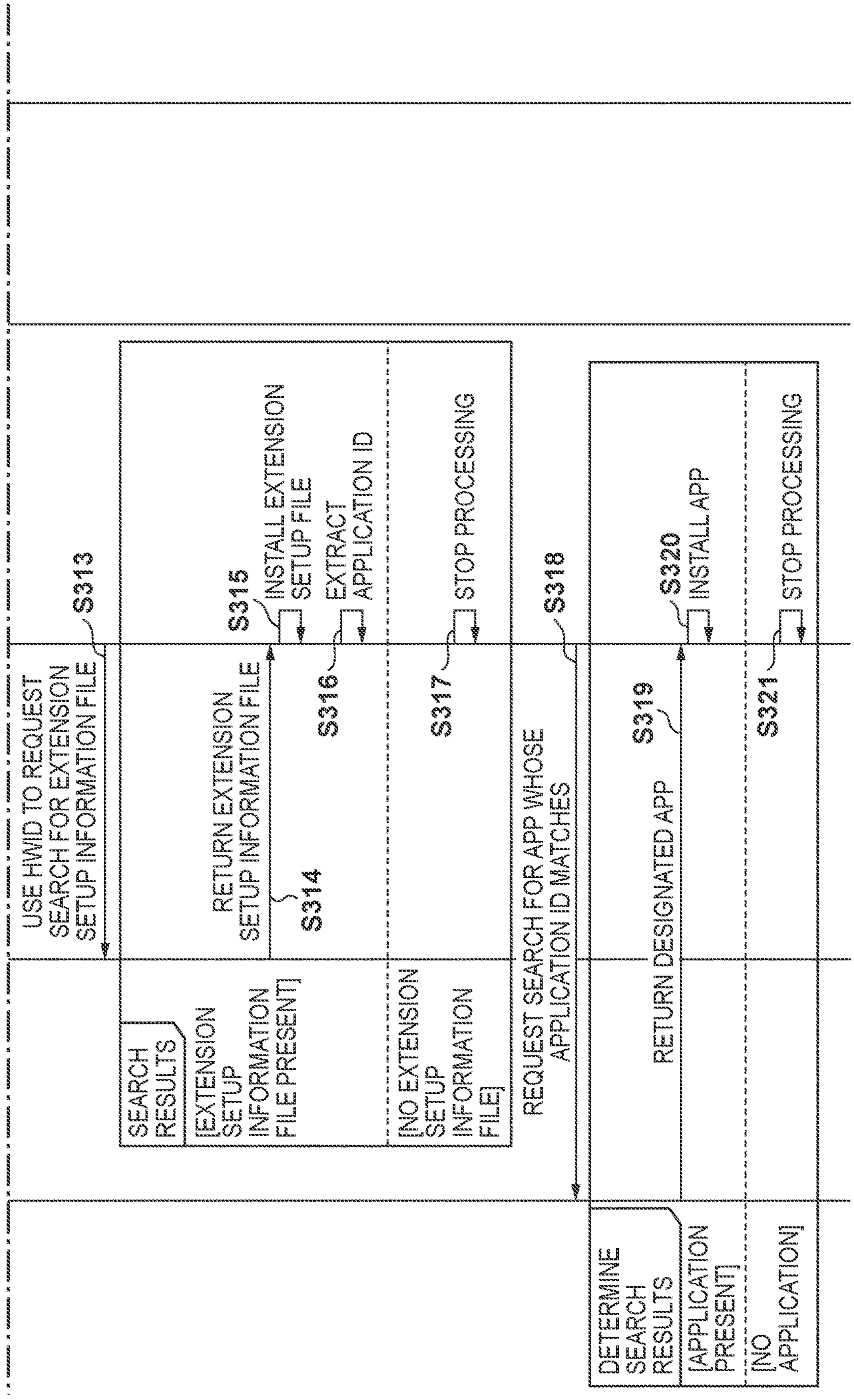

S313
USE HWID TO REQUEST SEARCH FOR EXTENSION SETUP INFORMATION FILE
SEARCH RESULTS
[EXTENSION SETUP INFORMATION FILE PRESENT]
RETURN EXTENSION SETUP INFORMATION FILE
S314
S315
INSTALL EXTENSION SETUP FILE
S316
EXTRACT APPLICATION ID
[NO EXTENSION SETUP INFORMATION FILE]
S317
STOP PROCESSING
REQUEST SEARCH FOR APP WHOSE APPLICATION ID MATCHES
S318
DETERMINE SEARCH RESULTS
[APPLICATION PRESENT]
RETURN DESIGNATED APP
S319
S320
INSTALL APP
[NO APPLICATION]
S321
STOP PROCESSING

FIG. 4

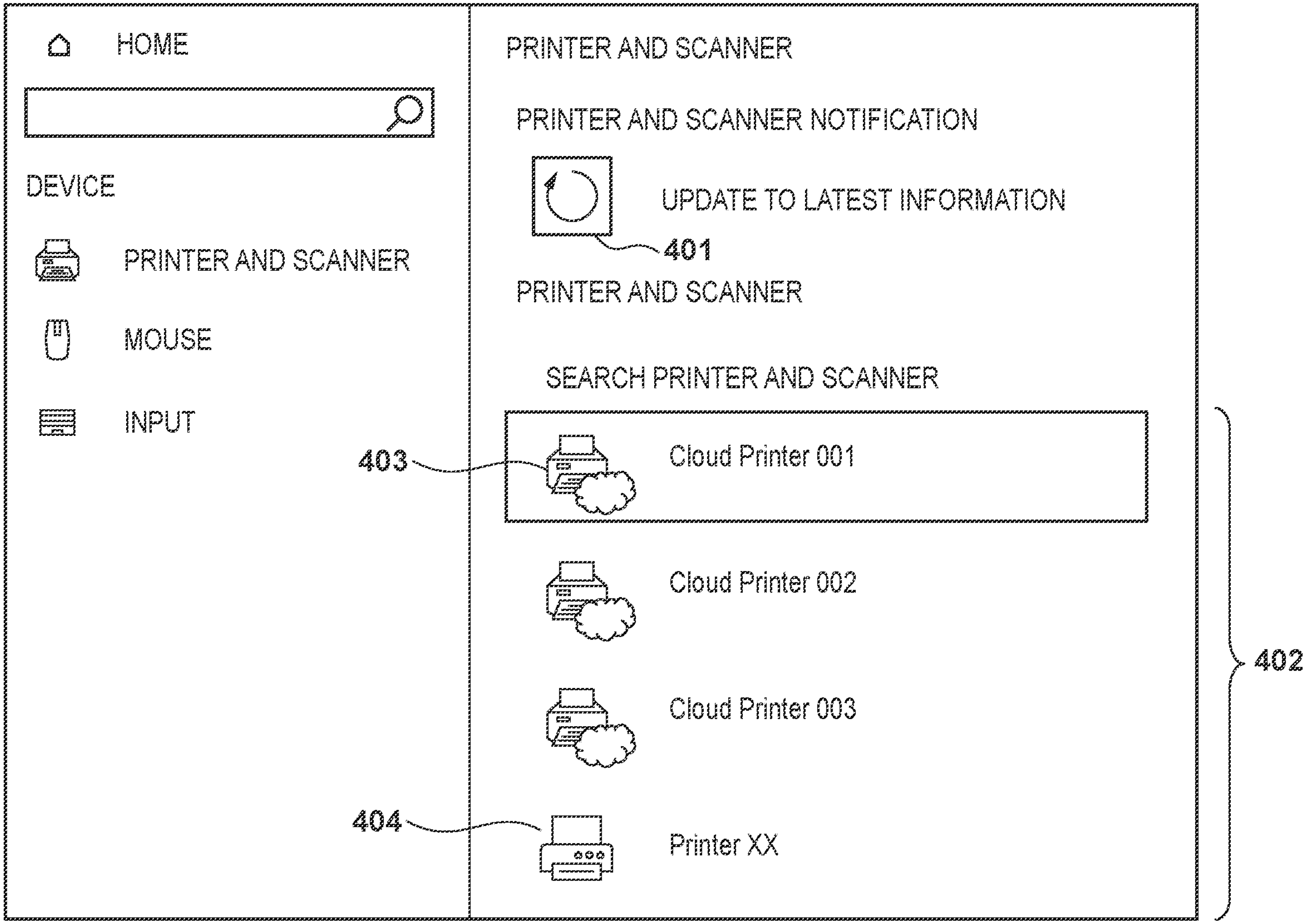
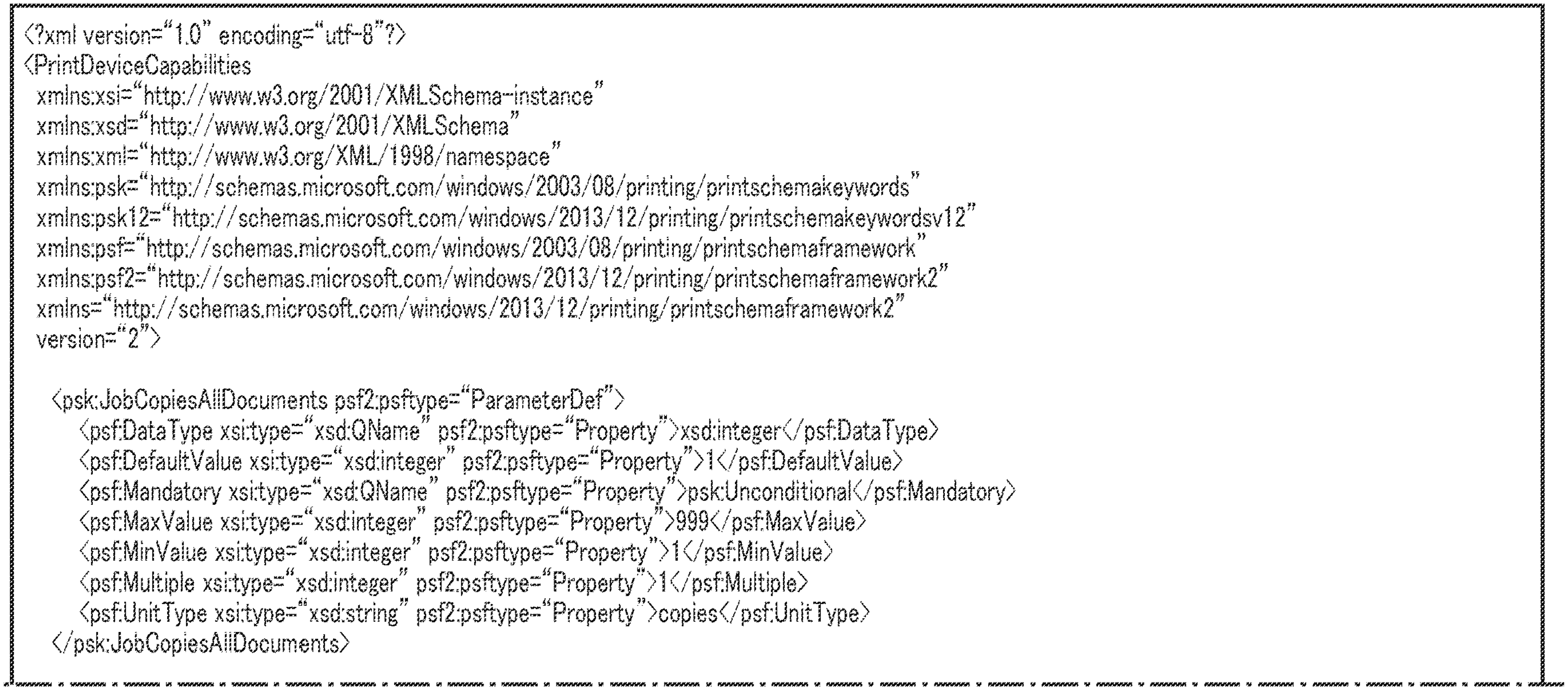

HOME
DEVICE
PRINTER AND SCANNER
MOUSE
INPUT
PRINTER AND SCANNER
PRINTER AND SCANNER NOTIFICATION
UPDATE TO LATEST INFORMATION
401
PRINTER AND SCANNER
SEARCH PRINTER AND SCANNER
403
Cloud Printer 001
Cloud Printer 002
Cloud Printer 003
404
Printer XX
402

FIG. 5

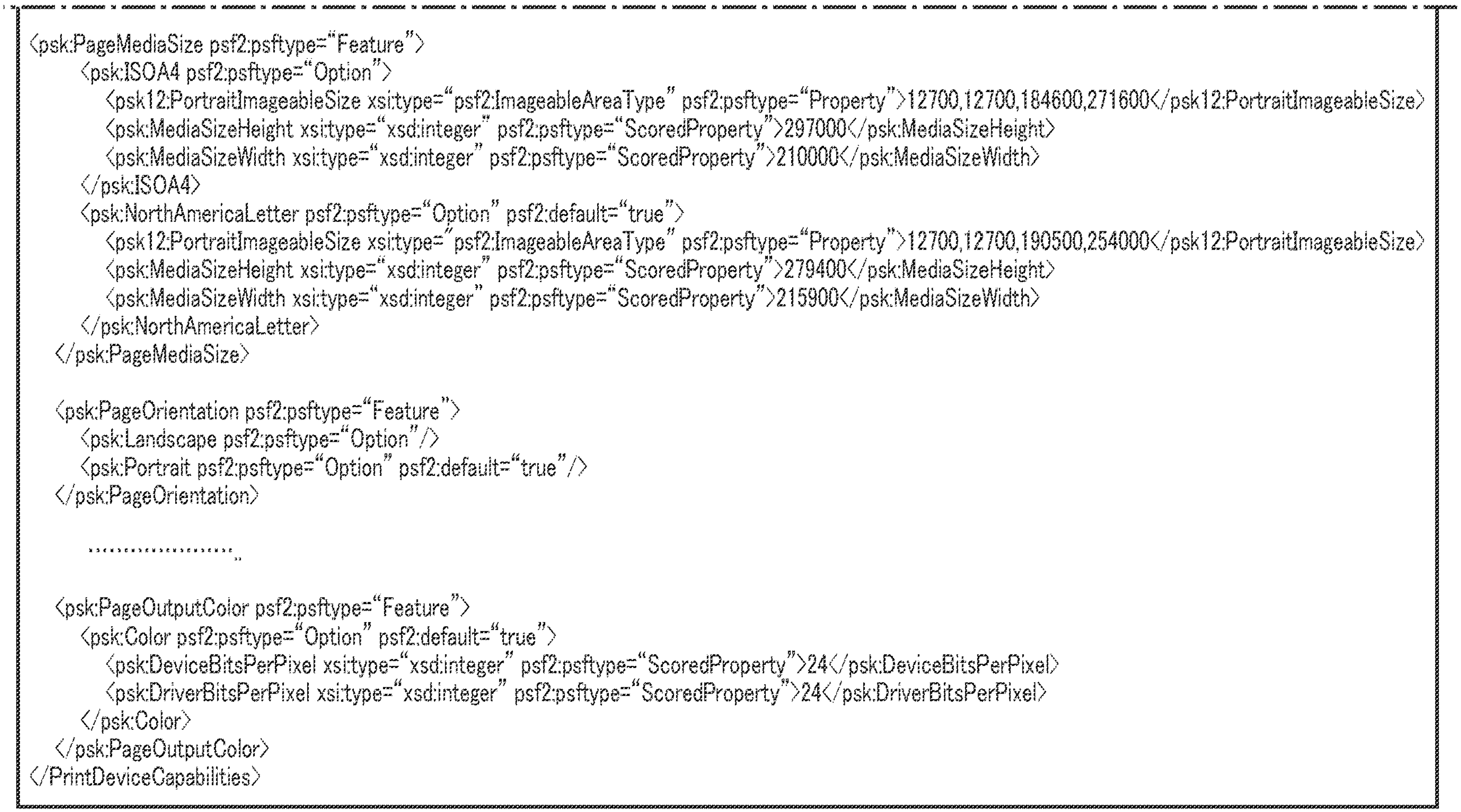
| | |
|---|---|
| TYPE OF PAPER | ENVELOPE/LABEL/PLAIN PAPER/PHOTO /PHOTO PAPER GLOSSY STANDARD /PHOTO PAPER MATTE/INK JET POSTCARD (COMMUNICATE) /INK JET POSTCARD (ADDRESS SIDE)/INK JET POSTCARD (COMMUNICATE) /INK JET PICTURE POSTCARD (ADDRESS SIDE) |
| NUMBER OF COPIES | Max=99 |
| ORIENTATION OF PAPER | VERTICAL/HORIZONTAL |
| PRINT QUALITY | STANDARD/DRAFT |
| PRINT ON A COPY BASIS | ON/OFF |
| STAPLE | NONE/AUTO/UPPER LEFT/LOWER LEFT/UPPER RIGHT/LOWER RIGHT /LEFT EDGE (BINDING AT 2 LOCATIONS)/UPPER EDGE (BINDING AT 2 LOCATIONS) /RIGHT EDGE (BINDING AT 2 LOCATIONS)/LOWER EDGE (BINDING AT 2 LOCATIONS) /SADDLE STITCH BINDING/STAPLELESS BINDING |
| MULTIPLE DOCUMENT HANDLING | ONLY ONE/ON DOCUMENT BASIS |
| MAXIMUM NUMBER OF DOCUMENT DIVISIONS | Max=50 |
| PUNCHING | NONE/PUNCH HOLES (AUTO)/PUNCH HOLES (2 HOLES LEFT)/PUNCH HOLES (3 HOLES LEFT) /PUNCH HOLES (4 HOLES LEFT)/PUNCH HOLES (MULTI LEFT)/PUNCH HOLES (2 HOLES RIGHT) /PUNCH HOLES (3 HOLES RIGHT)/PUNCH HOLES (4 HOLES RIGHT)/PUNCH HOLES (MULTI RIGHT) /PUNCH HOLES (2 HOLES TOP)/PUNCH HOLES (3 HOLES TOP)/PUNCH HOLES (4 HOLES TOP) /PUNCH HOLES (MULTI TOP)/PUNCH HOLES (2 HOLES BOTTOM)/PUNCH HOLES (3 HOLES BOTTOM) /PUNCH HOLES (4 HOLES BOTTOM)/PUNCH HOLES (MULTI BOTTOM) |
| FOLDING SETTING | NONE/FOLDED IN TWO/C FOLD/QUARTO FOLD/OUTER TRI-FOLD/Z FOLD /SADDLE FOLDING (OUTPUT FROM SADDLE FINISHER) |
| COLOR MODE | COLOR/MONOCHROME |
| PAGE AGGREGATION | OFF/2in1/4in1/6in1/9in1/16in1 |
| ARRANGEMENT ORDER | LEFT TO RIGHT/RIGHT TO LEFT |
| SCALING FACTOR | NONE/ALIGN TO PAGE WIDTH/ALIGN TO SCREEN SIZE |
| DOUBLE-SIDED PRINTING | SINGLE-SIDED/DOUBLE-SIDED |
| BINDING DIRECTION | LONG-SIDE BINDING/SHORT-SIDE BINDING |
| 180 DEGREE ROTATION | NONE/COUNTERCLOCKWISE/CLOCKWISE |
| SAVE JOB IN PRINTER | ON/OFF |
| ABBREVIATE JOB NAME | ON/OFF |
| SWITCH LANGUAGE | Japanese/English/French/German/Italian/Spanish/Portuguese/ Dutch/Danish/Norwegian/Swedish/Finnish/Polish/ Czech/ Russian/Turkish/Chinese(Simplified)/Chinese(Traditional)/Korean/ Thai/Indonesian |

FIG. 6A



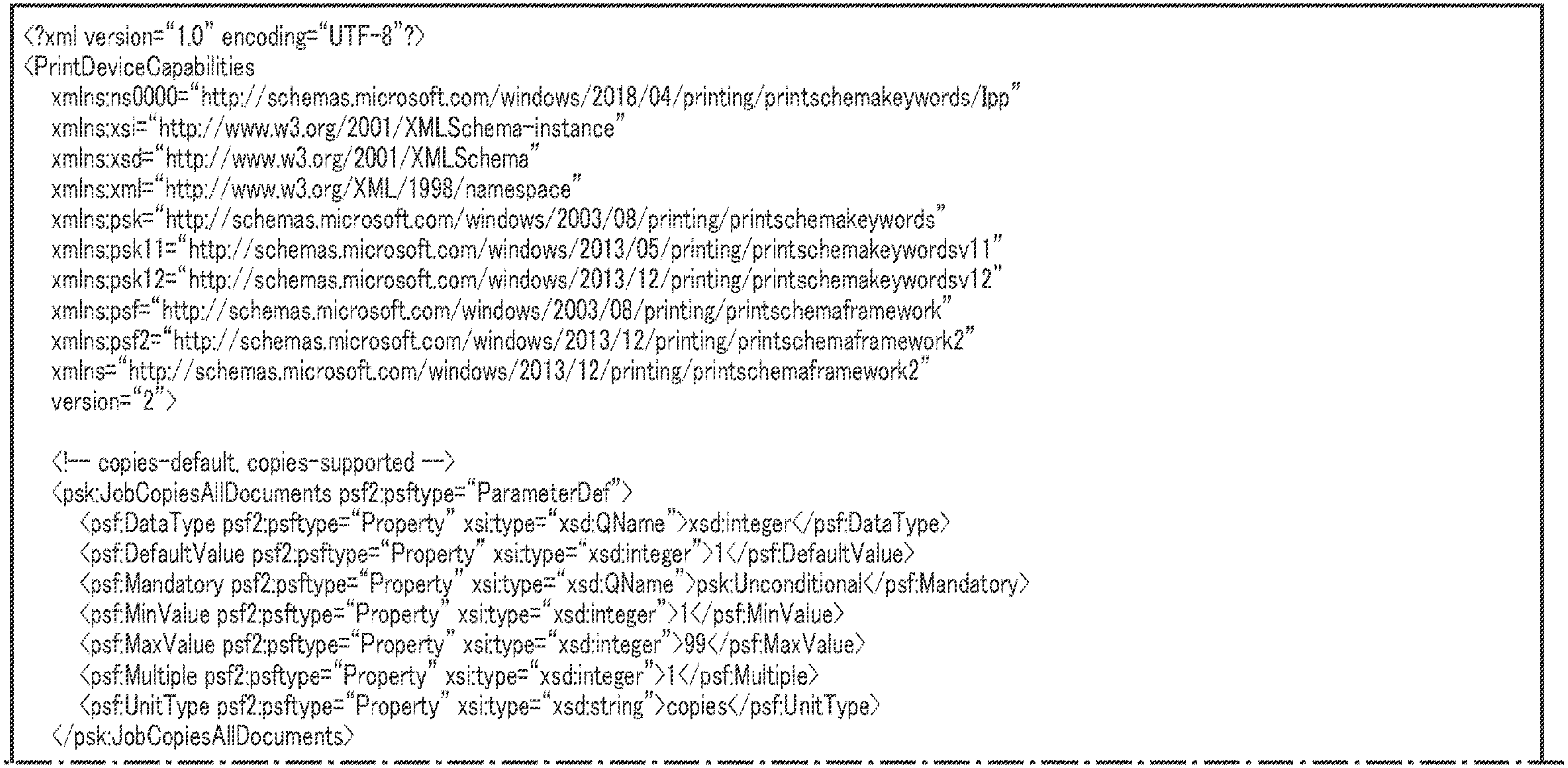
```
〈?xml version=“1.0” encoding=“utf-8”?〉
〈PrintDeviceCapabilities
 xmlns:xsi=“http://www.w3.org/2001/XMLSchema-instance”
 xmlns:xsd=“http://www.w3.org/2001/XMLSchema”
 xmlns:xml=“http://www.w3.org/XML/1998/namespace”
 xmlns:psk=“http://schemas.microsoft.com/windows/2003/08/printing/printschemakeywords”
 xmlns:psk12=“http://schemas.microsoft.com/windows/2013/12/printing/printschemakeywordsv12”
 xmlns:psf=“http://schemas.microsoft.com/windows/2003/08/printing/printschemaframework”
 xmlns:psf2=“http://schemas.microsoft.com/windows/2013/12/printing/printschemaframework2”
 xmlns=“http://schemas.microsoft.com/windows/2013/12/printing/printschemaframework2”
 version=“2”〉

  〈psk:JobCopiesAllDocuments psf2:psftype=“ParameterDef”〉
     〈psf:DataType xsi:type=“xsd:QName” psf2:psftype=“Property”>xsd:integer〈/psf:DataType〉
     〈psf:DefaultValue xsi:type=“xsd:integer” psf2:psftype=“Property”>1〈/psf:DefaultValue〉
     〈psf:Mandatory xsi:type=“xsd:QName” psf2:psftype=“Property”>psk:Unconditional〈/psf:Mandatory〉
     〈psf:MaxValue xsi:type=“xsd:integer” psf2:psftype=“Property”>999〈/psf:MaxValue〉
     〈psf:MinValue xsi:type=“xsd:integer” psf2:psftype=“Property”>1〈/psf:MinValue〉
     〈psf:Multiple xsi:type=“xsd:integer” psf2:psftype=“Property”>1〈/psf:Multiple〉
     〈psf:UnitType xsi:type=“xsd:string” psf2:psftype=“Property”>copies〈/psf:UnitType〉
  〈/psk:JobCopiesAllDocuments〉
```

FIG. 6B



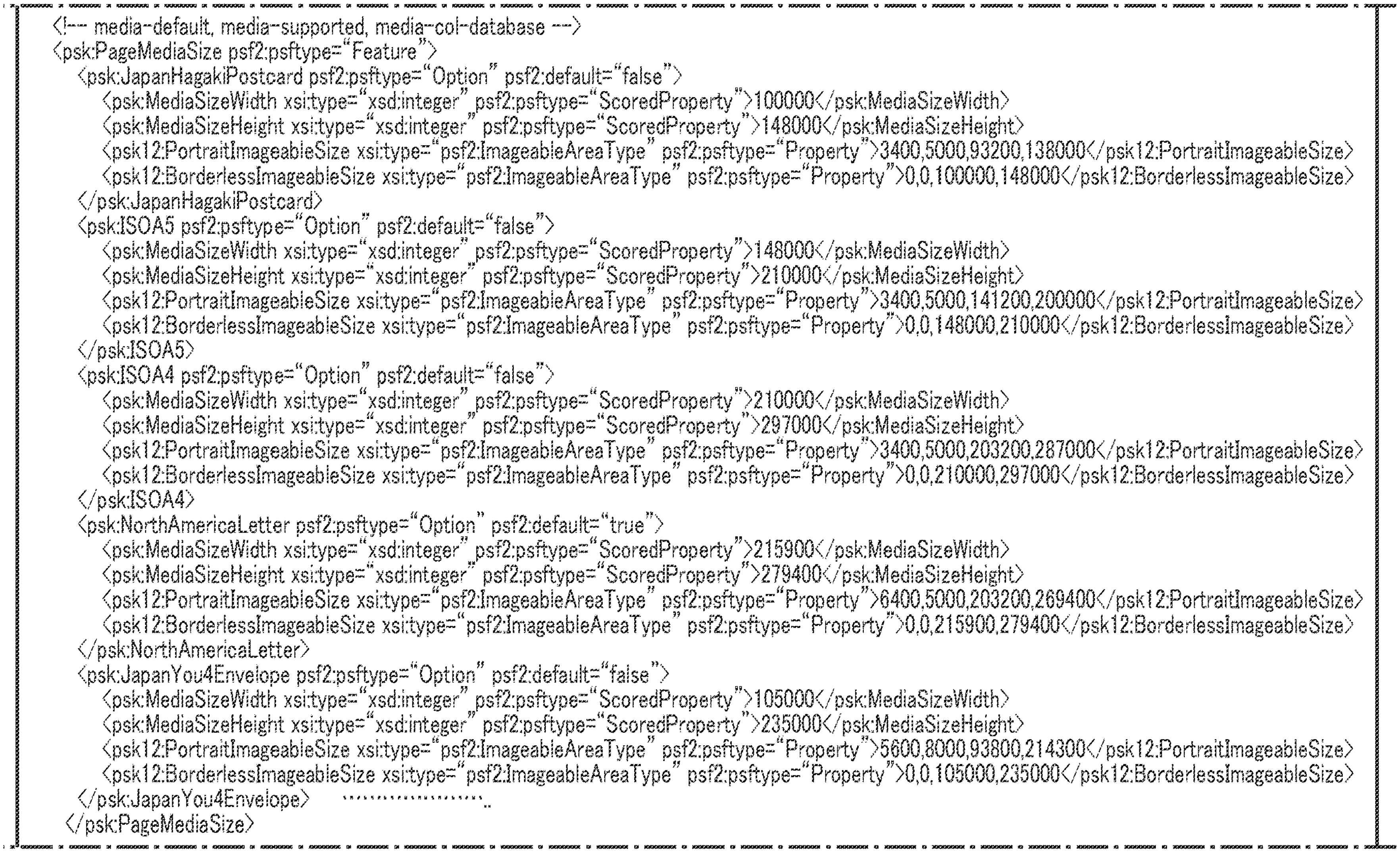
```
〈psk:PageMediaSize psf2:psftype=“Feature”〉
    〈psk:ISOA4 psf2:psftype=“Option”〉
      〈psk12:PortraitImageableSize xsi:type=“psf2:ImageableAreaType” psf2:psftype=“Property”〉12700,12700,184600,271600〈/psk12:PortraitImageableSize〉
      〈psk:MediaSizeHeight xsi:type=“xsd:integer” psf2:psftype=“ScoredProperty”〉297000〈/psk:MediaSizeHeight〉
      〈psk:MediaSizeWidth xsi:type=“xsd:integer” psf2:psftype=“ScoredProperty”〉210000〈/psk:MediaSizeWidth〉
    〈/psk:ISOA4〉
    〈psk:NorthAmericaLetter psf2:psftype=“Option” psf2:default=“true”〉
      〈psk12:PortraitImageableSize xsi:type=“psf2:ImageableAreaType” psf2:psftype=“Property”〉12700,12700,190500,254000〈/psk12:PortraitImageableSize〉
      〈psk:MediaSizeHeight xsi:type=“xsd:integer” psf2:psftype=“ScoredProperty”〉279400〈/psk:MediaSizeHeight〉
      〈psk:MediaSizeWidth xsi:type=“xsd:integer” psf2:psftype=“ScoredProperty”〉215900〈/psk:MediaSizeWidth〉
    〈/psk:NorthAmericaLetter〉
  〈/psk:PageMediaSize〉

  〈psk:PageOrientation psf2:psftype=“Feature”〉
    〈psk:Landscape psf2:psftype=“Option”/〉
    〈psk:Portrait psf2:psftype=“Option” psf2:default=“true”/〉
  〈/psk:PageOrientation〉

      ……………………”

  〈psk:PageOutputColor psf2:psftype=“Feature”〉
    〈psk:Color psf2:psftype=“Option” psf2:default=“true”〉
      〈psk:DeviceBitsPerPixel xsi:type=“xsd:integer” psf2:psftype=“ScoredProperty”〉24〈/psk:DeviceBitsPerPixel〉
      〈psk:DriverBitsPerPixel xsi:type=“xsd:integer” psf2:psftype=“ScoredProperty”〉24〈/psk:DriverBitsPerPixel〉
    〈/psk:Color〉
  〈/psk:PageOutputColor〉
〈/PrintDeviceCapabilities〉
```

FIG. 7A



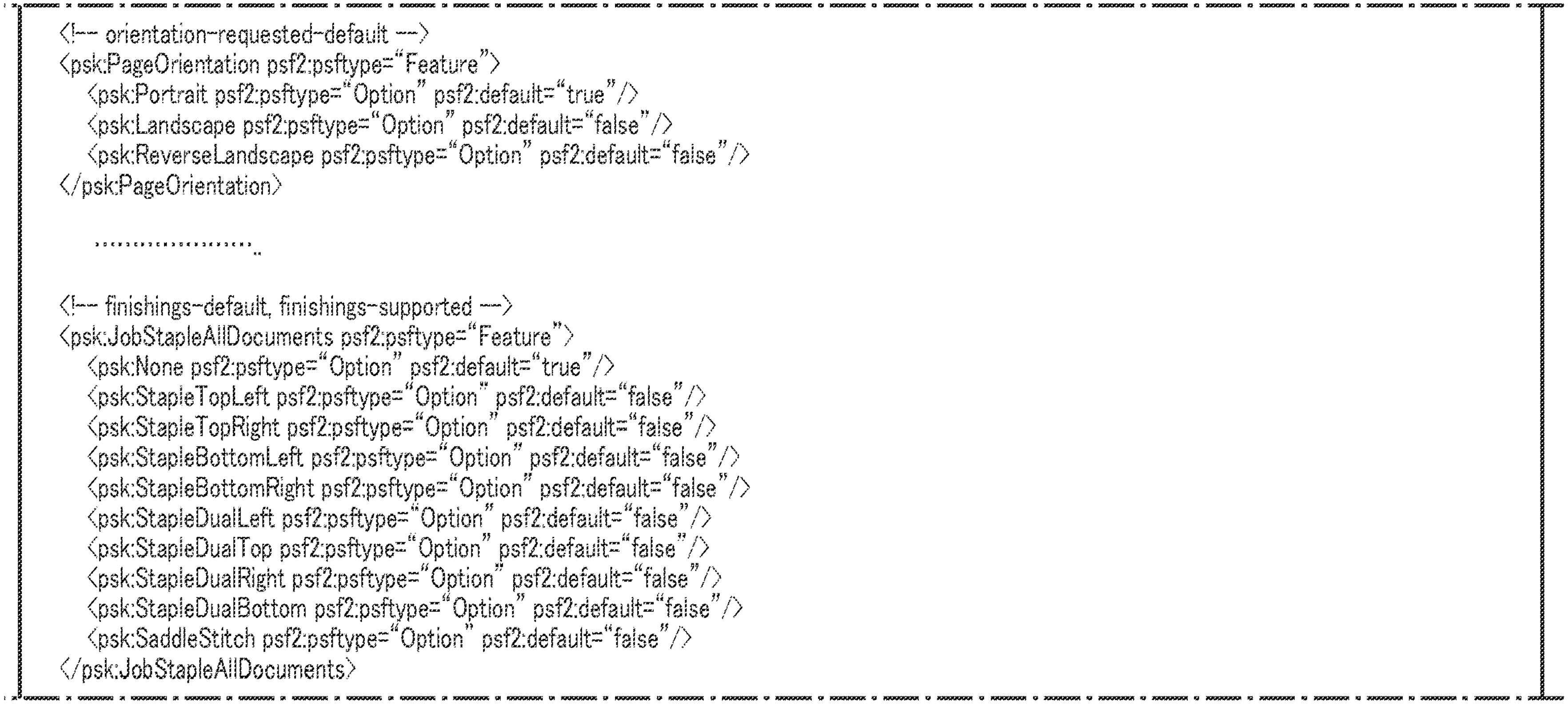
```
〈?xml version=“1.0” encoding=“UTF-8”?〉
〈PrintDeviceCapabilities
   xmlns:ns0000=“http://schemas.microsoft.com/windows/2018/04/printing/printschemakeywords/Ipp”
   xmlns:xsi=“http://www.w3.org/2001/XMLSchema-instance”
   xmlns:xsd=“http://www.w3.org/2001/XMLSchema”
   xmlns:xml=“http://www.w3.org/XML/1998/namespace”
   xmlns:psk=“http://schemas.microsoft.com/windows/2003/08/printing/printschemakeywords”
   xmlns:psk11=“http://schemas.microsoft.com/windows/2013/05/printing/printschemakeywordsv11”
   xmlns:psk12=“http://schemas.microsoft.com/windows/2013/12/printing/printschemakeywordsv12”
   xmlns:psf=“http://schemas.microsoft.com/windows/2003/08/printing/printschemaframework”
   xmlns:psf2=“http://schemas.microsoft.com/windows/2013/12/printing/printschemaframework2”
   xmlns=“http://schemas.microsoft.com/windows/2013/12/printing/printschemaframework2”
   version=“2”〉

   〈!-- copies-default, copies-supported --〉
   〈psk:JobCopiesAllDocuments psf2:psftype=“ParameterDef”〉
      〈psf:DataType psf2:psftype=“Property” xsi:type=“xsd:QName”〉xsd:integer〈/psf:DataType〉
      〈psf:DefaultValue psf2:psftype=“Property” xsi:type=“xsd:integer”〉1〈/psf:DefaultValue〉
      〈psf:Mandatory psf2:psftype=“Property” xsi:type=“xsd:QName”〉psk:Unconditional〈/psf:Mandatory〉
      〈psf:MinValue psf2:psftype=“Property” xsi:type=“xsd:integer”〉1〈/psf:MinValue〉
      〈psf:MaxValue psf2:psftype=“Property” xsi:type=“xsd:integer”〉99〈/psf:MaxValue〉
      〈psf:Multiple psf2:psftype=“Property” xsi:type=“xsd:integer”〉1〈/psf:Multiple〉
      〈psf:UnitType psf2:psftype=“Property” xsi:type=“xsd:string”〉copies〈/psf:UnitType〉
   〈/psk:JobCopiesAllDocuments〉
```

# F I G. 7B



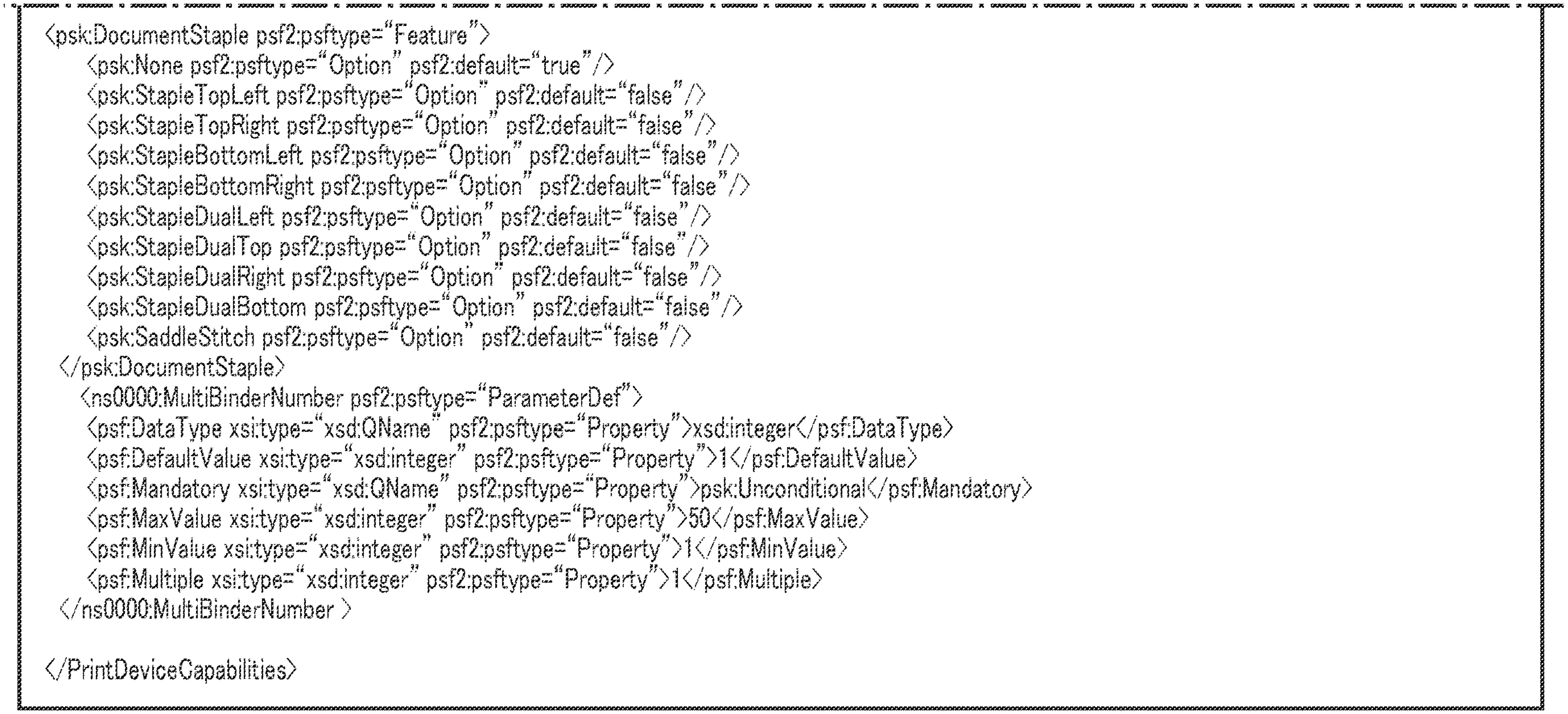
```
〈!-- media-default, media-supported, media-col-database --〉
〈psk:PageMediaSize psf2:psftype=“Feature”〉
  〈psk:JapanHagakiPostcard psf2:psftype=“Option” psf2:default=“false”〉
    〈psk:MediaSizeWidth xsi:type=“xsd:integer” psf2:psftype=“ScoredProperty”〉100000〈/psk:MediaSizeWidth〉
    〈psk:MediaSizeHeight xsi:type=“xsd:integer” psf2:psftype=“ScoredProperty”〉148000〈/psk:MediaSizeHeight〉
    〈psk12:PortraitImageableSize xsi:type=“psf2:ImageableAreaType” psf2:psftype=“Property”〉3400,5000,93200,138000〈/psk12:PortraitImageableSize〉
    〈psk12:BorderlessImageableSize xsi:type=“psf2:ImageableAreaType” psf2:psftype=“Property”〉0,0,100000,148000〈/psk12:BorderlessImageableSize〉
  〈/psk:JapanHagakiPostcard〉
  〈psk:ISOA5 psf2:psftype=“Option” psf2:default=“false”〉
    〈psk:MediaSizeWidth xsi:type=“xsd:integer” psf2:psftype=“ScoredProperty”〉148000〈/psk:MediaSizeWidth〉
    〈psk:MediaSizeHeight xsi:type=“xsd:integer” psf2:psftype=“ScoredProperty”〉210000〈/psk:MediaSizeHeight〉
    〈psk12:PortraitImageableSize xsi:type=“psf2:ImageableAreaType” psf2:psftype=“Property”〉3400,5000,141200,200000〈/psk12:PortraitImageableSize〉
    〈psk12:BorderlessImageableSize xsi:type=“psf2:ImageableAreaType” psf2:psftype=“Property”〉0,0,148000,210000〈/psk12:BorderlessImageableSize〉
  〈/psk:ISOA5〉
  〈psk:ISOA4 psf2:psftype=“Option” psf2:default=“false”〉
    〈psk:MediaSizeWidth xsi:type=“xsd:integer” psf2:psftype=“ScoredProperty”〉210000〈/psk:MediaSizeWidth〉
    〈psk:MediaSizeHeight xsi:type=“xsd:integer” psf2:psftype=“ScoredProperty”〉297000〈/psk:MediaSizeHeight〉
    〈psk12:PortraitImageableSize xsi:type=“psf2:ImageableAreaType” psf2:psftype=“Property”〉3400,5000,203200,287000〈/psk12:PortraitImageableSize〉
    〈psk12:BorderlessImageableSize xsi:type=“psf2:ImageableAreaType” psf2:psftype=“Property”〉0,0,210000,297000〈/psk12:BorderlessImageableSize〉
  〈/psk:ISOA4〉
  〈psk:NorthAmericaLetter psf2:psftype=“Option” psf2:default=“true”〉
    〈psk:MediaSizeWidth xsi:type=“xsd:integer” psf2:psftype=“ScoredProperty”〉215900〈/psk:MediaSizeWidth〉
    〈psk:MediaSizeHeight xsi:type=“xsd:integer” psf2:psftype=“ScoredProperty”〉279400〈/psk:MediaSizeHeight〉
    〈psk12:PortraitImageableSize xsi:type=“psf2:ImageableAreaType” psf2:psftype=“Property”〉6400,5000,203200,269400〈/psk12:PortraitImageableSize〉
    〈psk12:BorderlessImageableSize xsi:type=“psf2:ImageableAreaType” psf2:psftype=“Property”〉0,0,215900,279400〈/psk12:BorderlessImageableSize〉
  〈/psk:NorthAmericaLetter〉
  〈psk:JapanYou4Envelope psf2:psftype=“Option” psf2:default=“false”〉
    〈psk:MediaSizeWidth xsi:type=“xsd:integer” psf2:psftype=“ScoredProperty”〉105000〈/psk:MediaSizeWidth〉
    〈psk:MediaSizeHeight xsi:type=“xsd:integer” psf2:psftype=“ScoredProperty”〉235000〈/psk:MediaSizeHeight〉
    〈psk12:PortraitImageableSize xsi:type=“psf2:ImageableAreaType” psf2:psftype=“Property”〉5600,8000,93800,214300〈/psk12:PortraitImageableSize〉
    〈psk12:BorderlessImageableSize xsi:type=“psf2:ImageableAreaType” psf2:psftype=“Property”〉0,0,105000,235000〈/psk12:BorderlessImageableSize〉
  〈/psk:JapanYou4Envelope〉    ····················..
 〈/psk:PageMediaSize〉
```

FIG. 7C



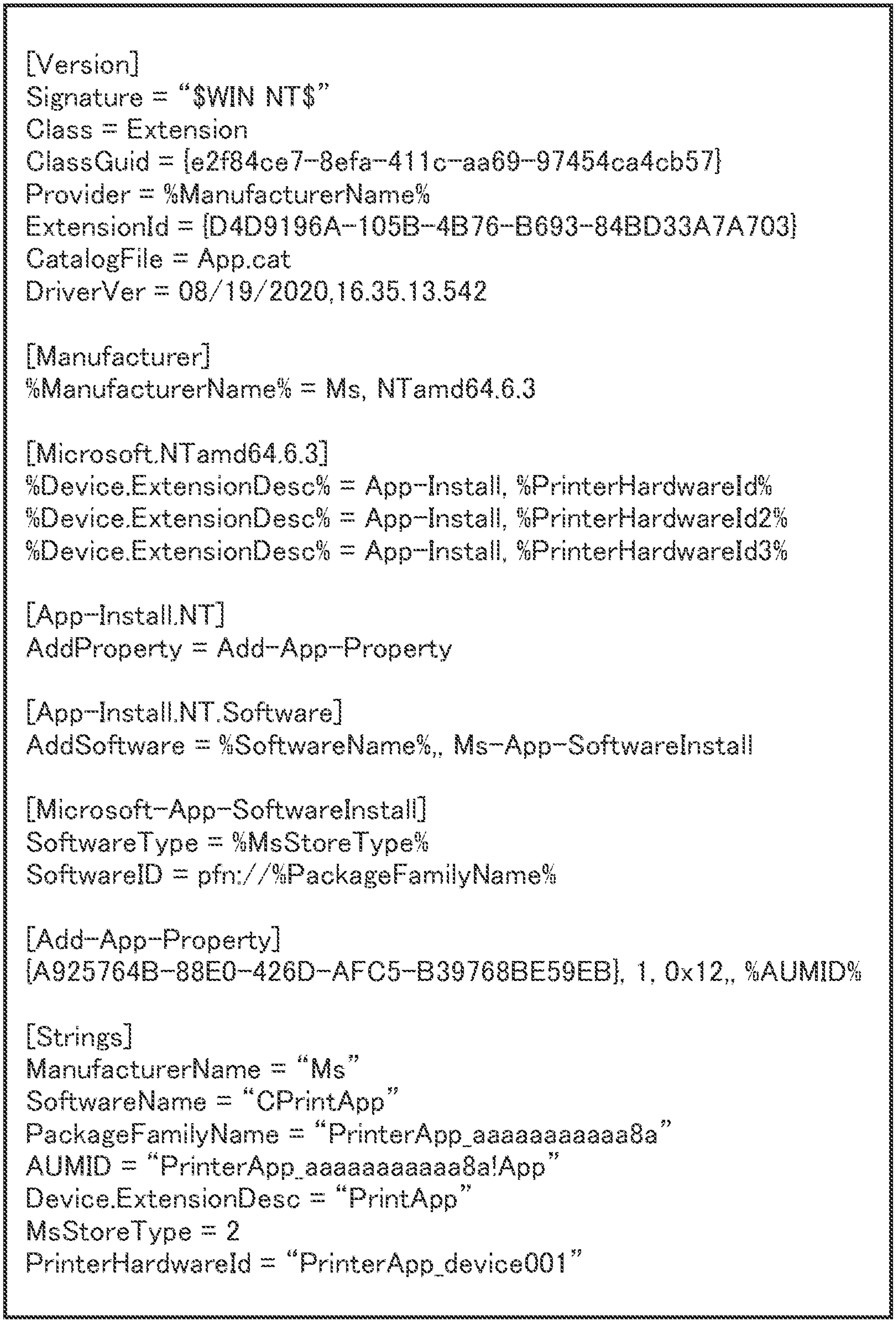
```
<!-- orientation-requested-default -->
<psk:PageOrientation psf2:psftype=“Feature”>
   <psk:Portrait psf2:psftype=“Option” psf2:default=“true”/>
   <psk:Landscape psf2:psftype=“Option” psf2:default=“false”/>
   <psk:ReverseLandscape psf2:psftype=“Option” psf2:default=“false”/>
</psk:PageOrientation>

   .....................

<!-- finishings-default, finishings-supported -->
<psk:JobStapleAllDocuments psf2:psftype=“Feature”>
   <psk:None psf2:psftype=“Option” psf2:default=“true”/>
   <psk:StapleTopLeft psf2:psftype=“Option” psf2:default=“false”/>
   <psk:StapleTopRight psf2:psftype=“Option” psf2:default=“false”/>
   <psk:StapleBottomLeft psf2:psftype=“Option” psf2:default=“false”/>
   <psk:StapleBottomRight psf2:psftype=“Option” psf2:default=“false”/>
   <psk:StapleDualLeft psf2:psftype=“Option” psf2:default=“false”/>
   <psk:StapleDualTop psf2:psftype=“Option” psf2:default=“false”/>
   <psk:StapleDualRight psf2:psftype=“Option” psf2:default=“false”/>
   <psk:StapleDualBottom psf2:psftype=“Option” psf2:default=“false”/>
   <psk:SaddleStitch psf2:psftype=“Option” psf2:default=“false”/>
</psk:JobStapleAllDocuments>
```

F I G. 7D



```
〈psk:DocumentStaple psf2:psftype=“Feature”〉
    〈psk:None psf2:psftype=“Option” psf2:default=“true”/〉
    〈psk:StapleTopLeft psf2:psftype=“Option” psf2:default=“false”/〉
    〈psk:StapleTopRight psf2:psftype=“Option” psf2:default=“false”/〉
    〈psk:StapleBottomLeft psf2:psftype=“Option” psf2:default=“false”/〉
    〈psk:StapleBottomRight psf2:psftype=“Option” psf2:default=“false”/〉
    〈psk:StapleDualLeft psf2:psftype=“Option” psf2:default=“false”/〉
    〈psk:StapleDualTop psf2:psftype=“Option” psf2:default=“false”/〉
    〈psk:StapleDualRight psf2:psftype=“Option” psf2:default=“false”/〉
    〈psk:StapleDualBottom psf2:psftype=“Option” psf2:default=“false”/〉
    〈psk:SaddleStitch psf2:psftype=“Option” psf2:default=“false”/〉
 〈/psk:DocumentStaple〉
   〈ns0000:MultiBinderNumber psf2:psftype=“ParameterDef”〉
    〈psf:DataType xsi:type=“xsd:QName” psf2:psftype=“Property”〉xsd:integer〈/psf:DataType〉
    〈psf:DefaultValue xsi:type=“xsd:integer” psf2:psftype=“Property”〉1〈/psf:DefaultValue〉
    〈psf:Mandatory xsi:type=“xsd:QName” psf2:psftype=“Property”〉psk:Unconditional〈/psf:Mandatory〉
    〈psf:MaxValue xsi:type=“xsd:integer” psf2:psftype=“Property”〉50〈/psf:MaxValue〉
    〈psf:MinValue xsi:type=“xsd:integer” psf2:psftype=“Property”〉1〈/psf:MinValue〉
    〈psf:Multiple xsi:type=“xsd:integer” psf2:psftype=“Property”〉1〈/psf:Multiple〉
 〈/ns0000:MultiBinderNumber 〉

〈/PrintDeviceCapabilities〉
```

FIG. 8



```
[Version]
Signature = "$WIN NT$"
Class = Extension
ClassGuid = {e2f84ce7-8efa-411c-aa69-97454ca4cb57}
Provider = %ManufacturerName%
ExtensionId = {D4D9196A-105B-4B76-B693-84BD33A7A703}
CatalogFile = App.cat
DriverVer = 08/19/2020,16.35.13.542

[Manufacturer]
%ManufacturerName% = Ms, NTamd64.6.3

[Microsoft.NTamd64.6.3]
%Device.ExtensionDesc% = App-Install, %PrinterHardwareId%
%Device.ExtensionDesc% = App-Install, %PrinterHardwareId2%
%Device.ExtensionDesc% = App-Install, %PrinterHardwareId3%

[App-Install.NT]
AddProperty = Add-App-Property

[App-Install.NT.Software]
AddSoftware = %SoftwareName%,, Ms-App-SoftwareInstall

[Microsoft-App-SoftwareInstall]
SoftwareType = %MsStoreType%
SoftwareID = pfn://%PackageFamilyName%

[Add-App-Property]
{A925764B-88E0-426D-AFC5-B39768BE59EB}, 1, 0x12,, %AUMID%

[Strings]
ManufacturerName = "Ms"
SoftwareName = "CPrintApp"
PackageFamilyName = "PrinterApp_aaaaaaaaaaa8a"
AUMID = "PrinterApp_aaaaaaaaaaa8a!App"
Device.ExtensionDesc = "PrintApp"
MsStoreType = 2
PrinterHardwareId = "PrinterApp_device001"
```

FIG. 9A

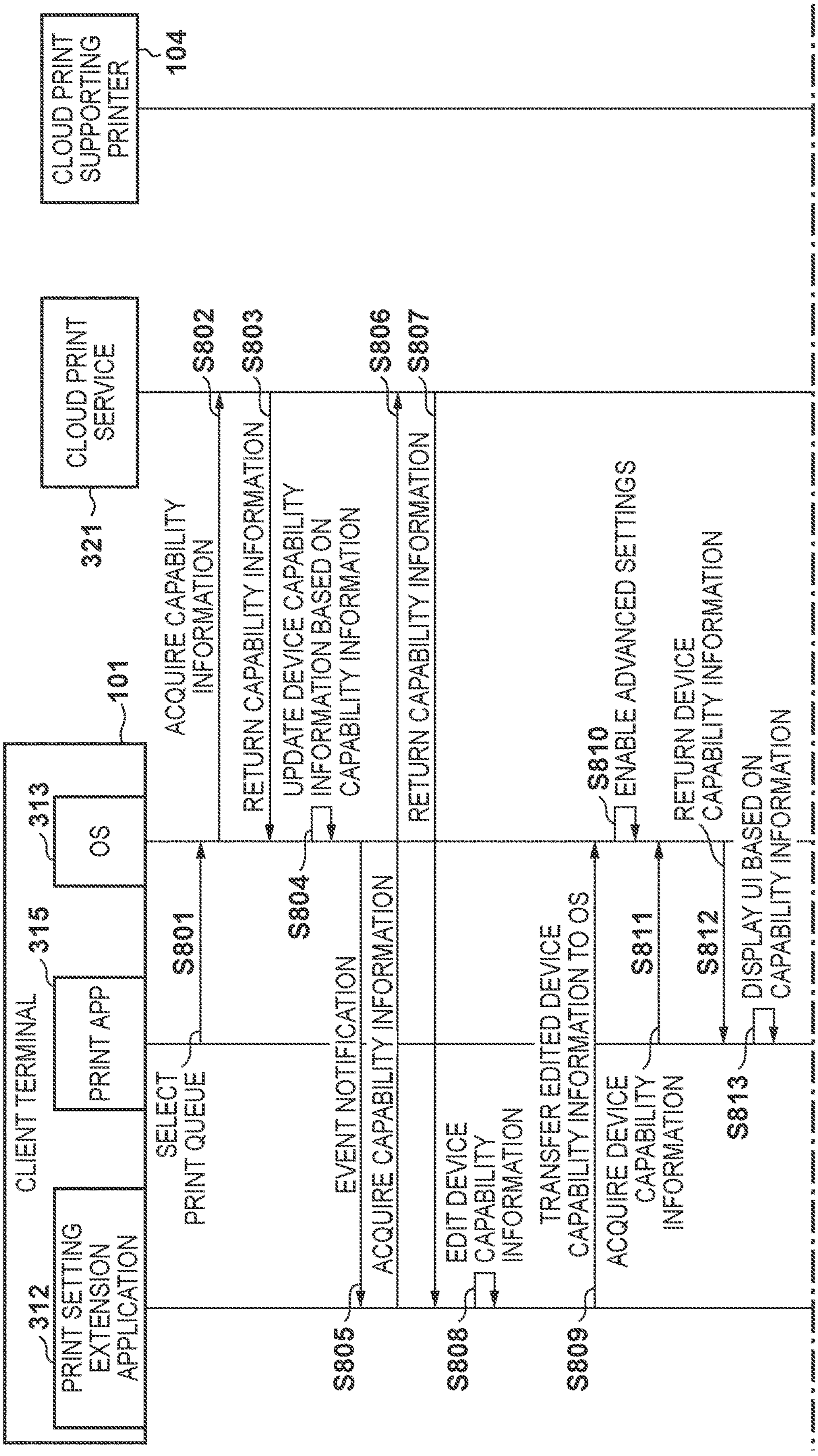

CLIENT TERMINAL
101
PRINT SETTING EXTENSION APPLICATION
312
PRINT APP
315
OS
313
CLOUD PRINT SERVICE
321
CLOUD PRINT SUPPORTING PRINTER
104
S801
SELECT PRINT QUEUE
S802
ACQUIRE CAPABILITY INFORMATION
S803
RETURN CAPABILITY INFORMATION
S804
UPDATE DEVICE CAPABILITY INFORMATION BASED ON CAPABILITY INFORMATION
S805
EVENT NOTIFICATION
ACQUIRE CAPABILITY INFORMATION
S806
S807
RETURN CAPABILITY INFORMATION
S808
EDIT DEVICE CAPABILITY INFORMATION
S809
TRANSFER EDITED DEVICE CAPABILITY INFORMATION TO OS
S810
ENABLE ADVANCED SETTINGS
S811
ACQUIRE DEVICE CAPABILITY INFORMATION
S812
RETURN DEVICE CAPABILITY INFORMATION
S813
DISPLAY UI BASED ON CAPABILITY INFORMATION

FIG. 9B

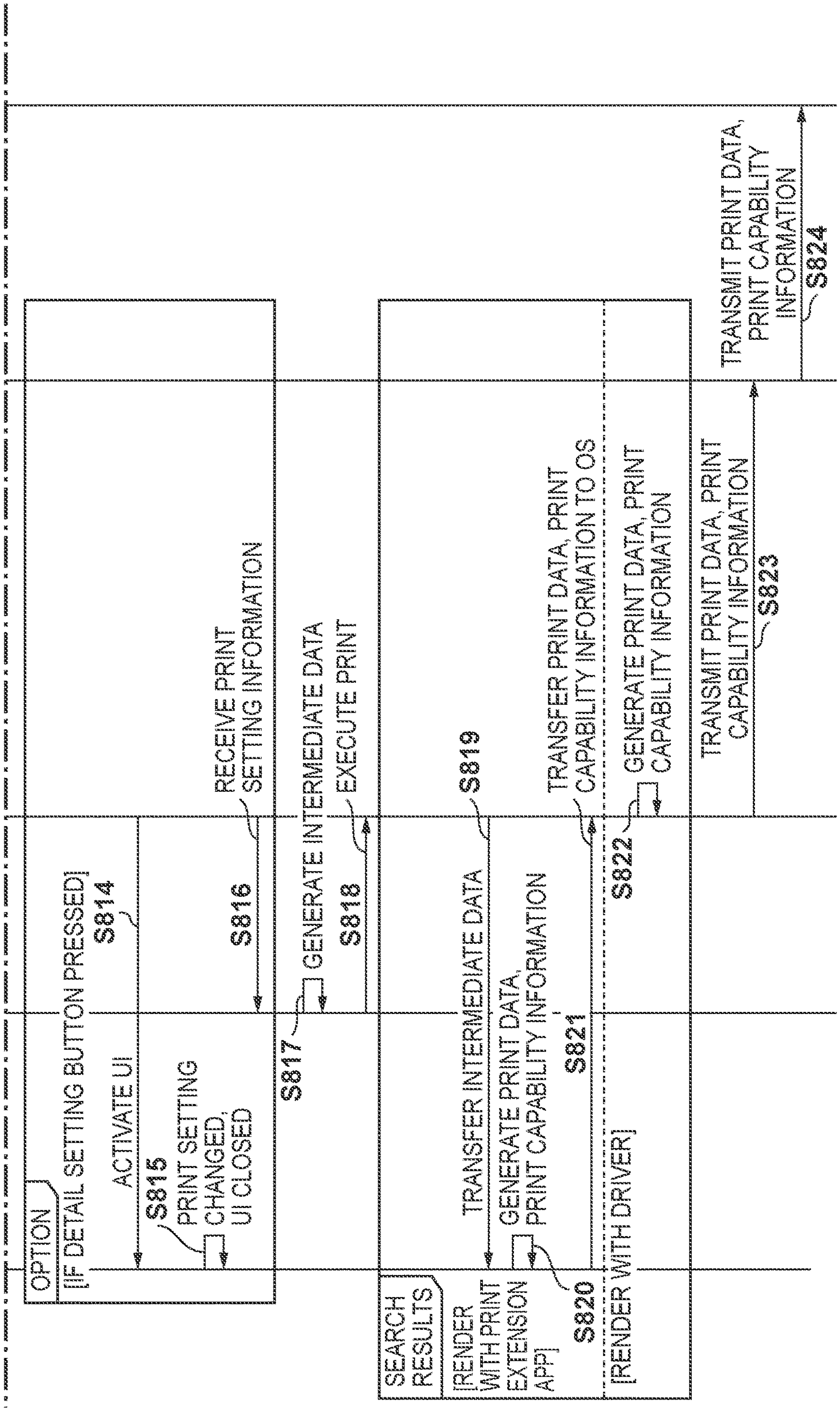
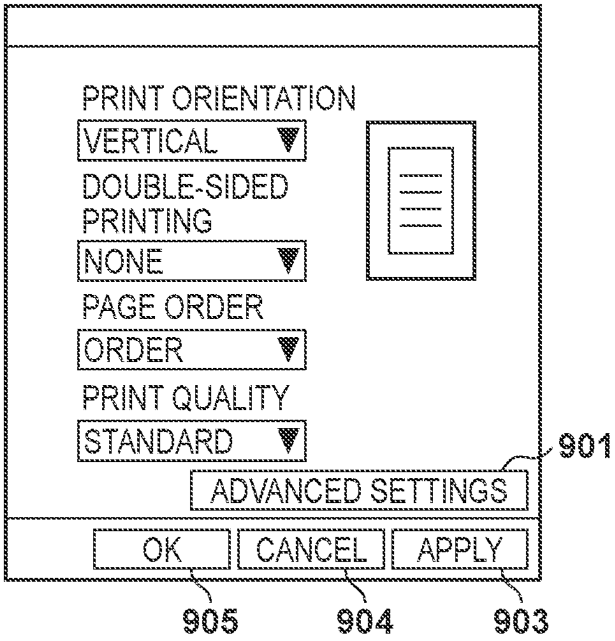

OPTION
[IF DETAIL SETTING BUTTON PRESSED]
S814
ACTIVATE UI
S815
PRINT SETTING CHANGED, UI CLOSED
S816
RECEIVE PRINT SETTING INFORMATION
S817
GENERATE INTERMEDIATE DATA
S818
EXECUTE PRINT
SEARCH RESULTS
[RENDER WITH PRINT EXTENSION APP]
S819
TRANSFER INTERMEDIATE DATA
S820
GENERATE PRINT DATA, PRINT CAPABILITY INFORMATION
S821
TRANSFER PRINT DATA, PRINT CAPABILITY INFORMATION TO OS
[RENDER WITH DRIVER]
S822
GENERATE PRINT DATA, PRINT CAPABILITY INFORMATION
S823
TRANSMIT PRINT DATA, PRINT CAPABILITY INFORMATION
S824
TRANSMIT PRINT DATA, PRINT CAPABILITY INFORMATION

FIG. 10A



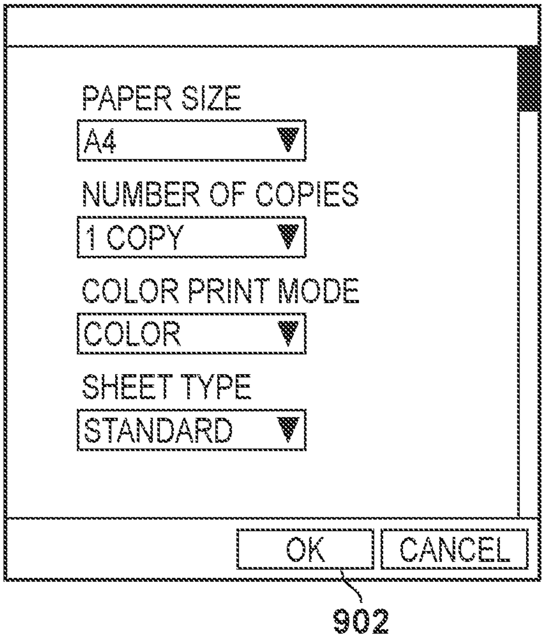
PRINT ORIENTATION: VERTICAL ▼

DOUBLE-SIDED PRINTING: NONE ▼

PAGE ORDER: ORDER ▼

PRINT QUALITY: STANDARD ▼

FIG. 10B



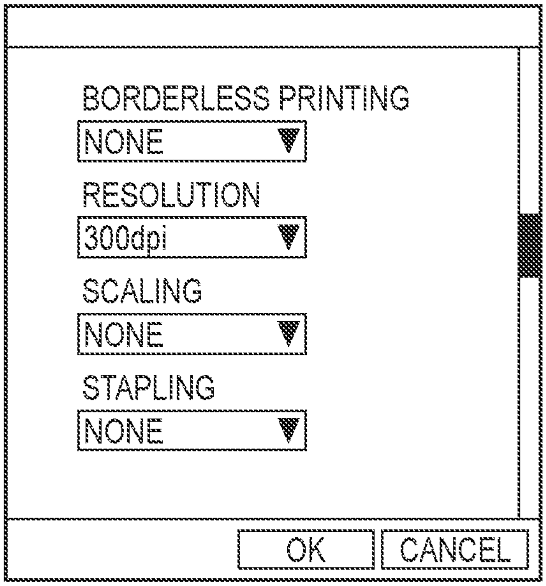
PAPER SIZE: A4 ▼

NUMBER OF COPIES: 1 COPY ▼

COLOR PRINT MODE: COLOR ▼

SHEET TYPE: STANDARD ▼

FIG. 10C



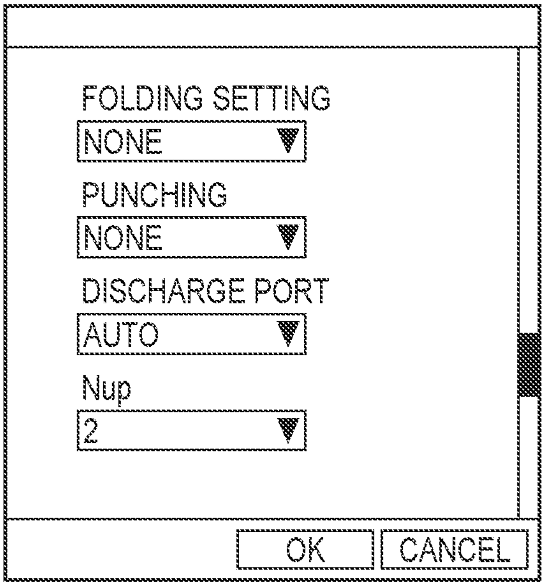
BORDERLESS PRINTING: NONE ▼

RESOLUTION: 300dpi ▼

SCALING: NONE ▼

STAPLING: NONE ▼

FIG. 10D



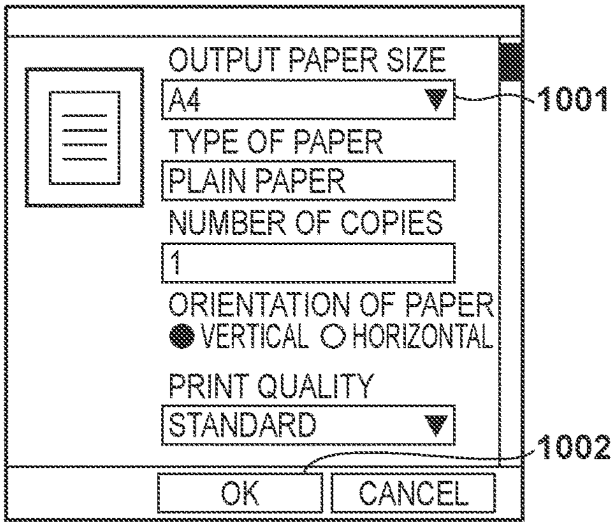
FOLDING SETTING: NONE ▼

PUNCHING: NONE ▼

DISCHARGE PORT: AUTO ▼

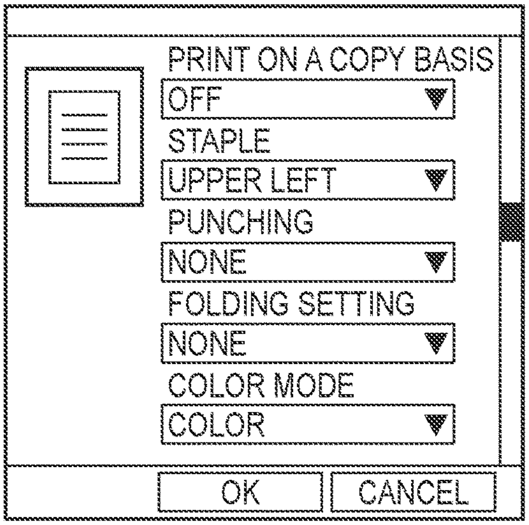
Nup: 2 ▼

FIG. 11A



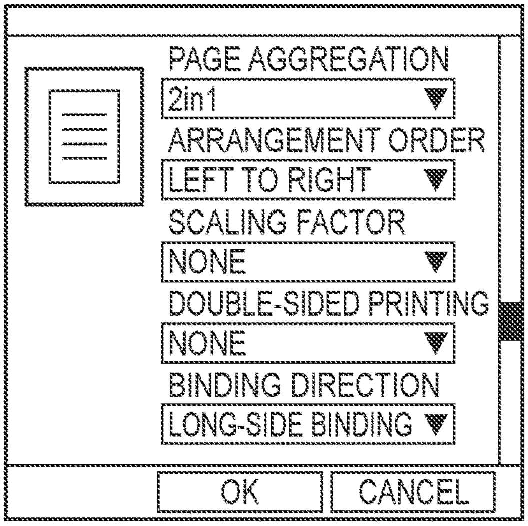
OUTPUT PAPER SIZE
A4 ▼
TYPE OF PAPER
PLAIN PAPER
NUMBER OF COPIES
1
ORIENTATION OF PAPER
● VERTICAL ○ HORIZONTAL
PRINT QUALITY
STANDARD ▼

FIG. 11B



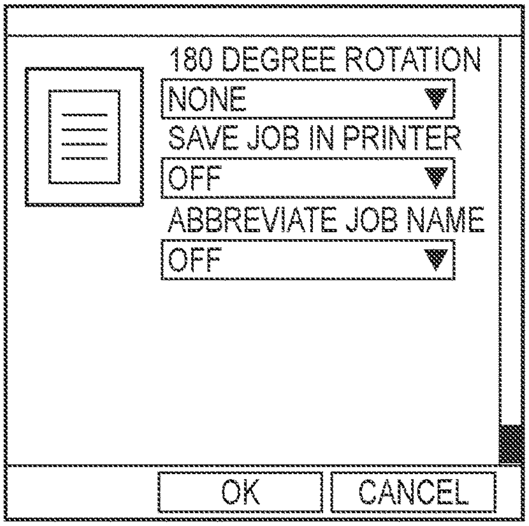
PRINT ON A COPY BASIS
OFF ▼
STAPLE
UPPER LEFT ▼
PUNCHING
NONE ▼
FOLDING SETTING
NONE ▼
COLOR MODE
COLOR ▼

FIG. 11C



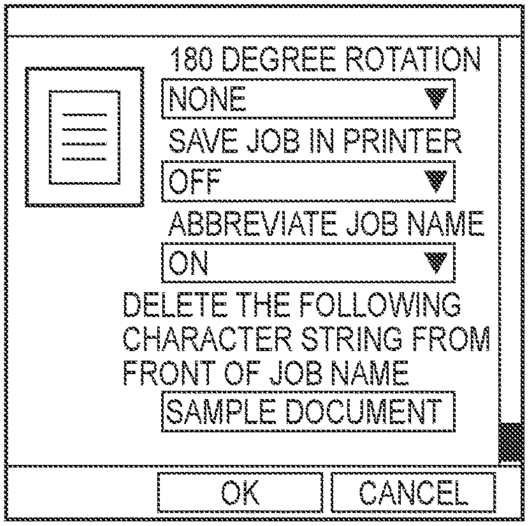
PAGE AGGREGATION
2in1 ▼
ARRANGEMENT ORDER
LEFT TO RIGHT ▼
SCALING FACTOR
NONE ▼
DOUBLE-SIDED PRINTING
NONE ▼
BINDING DIRECTION
LONG-SIDE BINDING ▼

FIG. 11D



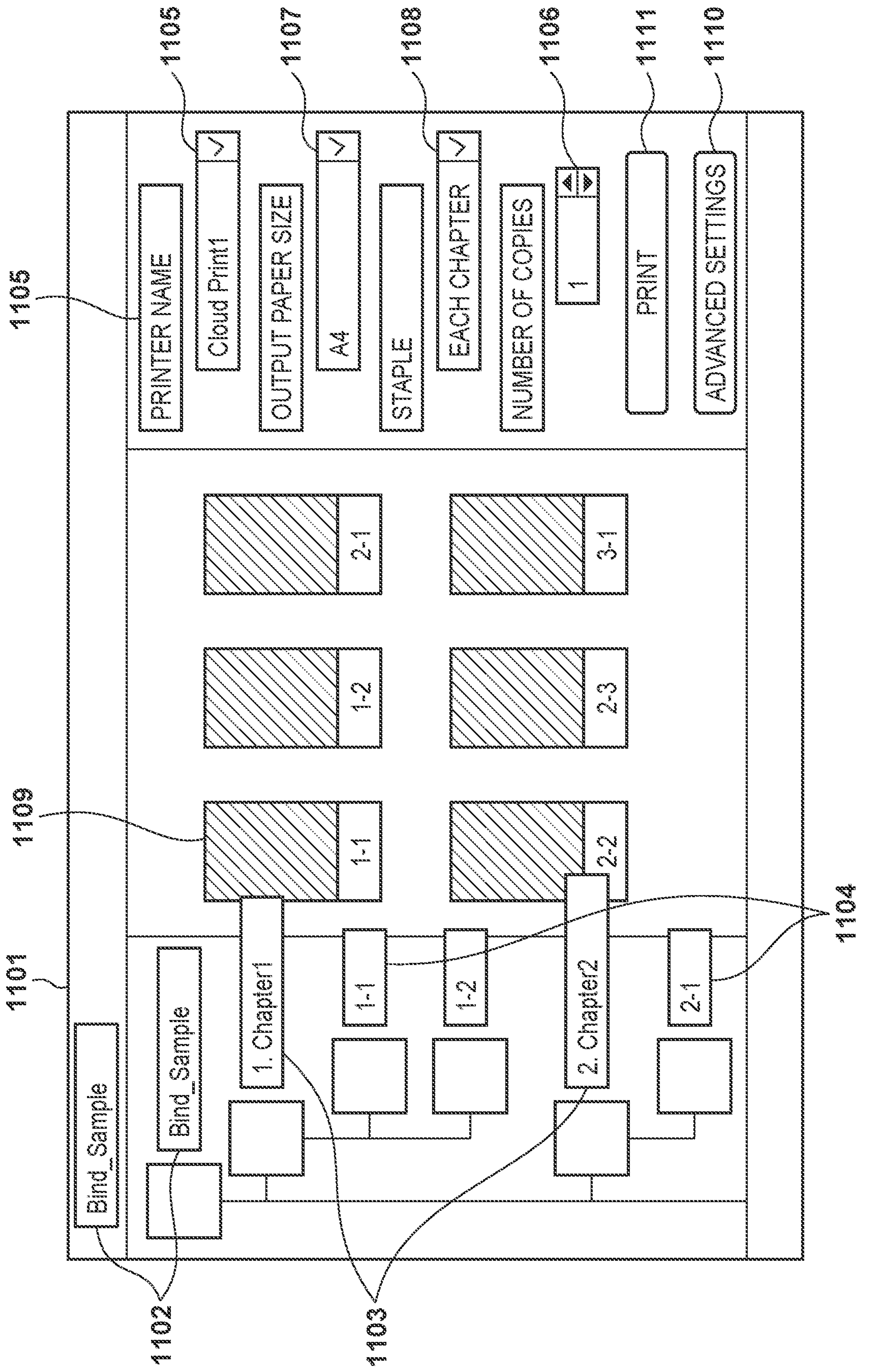
180 DEGREE ROTATION
NONE ▼
SAVE JOB IN PRINTER
OFF ▼
ABBREVIATE JOB NAME
OFF ▼

FIG. 11E



180 DEGREE ROTATION
NONE ▼
SAVE JOB IN PRINTER
OFF ▼
ABBREVIATE JOB NAME
ON ▼
DELETE THE FOLLOWING CHARACTER STRING FROM FRONT OF JOB NAME
SAMPLE DOCUMENT

# FIG. 12



PRINTER NAME: Cloud Print1

OUTPUT PAPER SIZE: A4

STAPLE: EACH CHAPTER

NUMBER OF COPIES: 1

FIG. 13

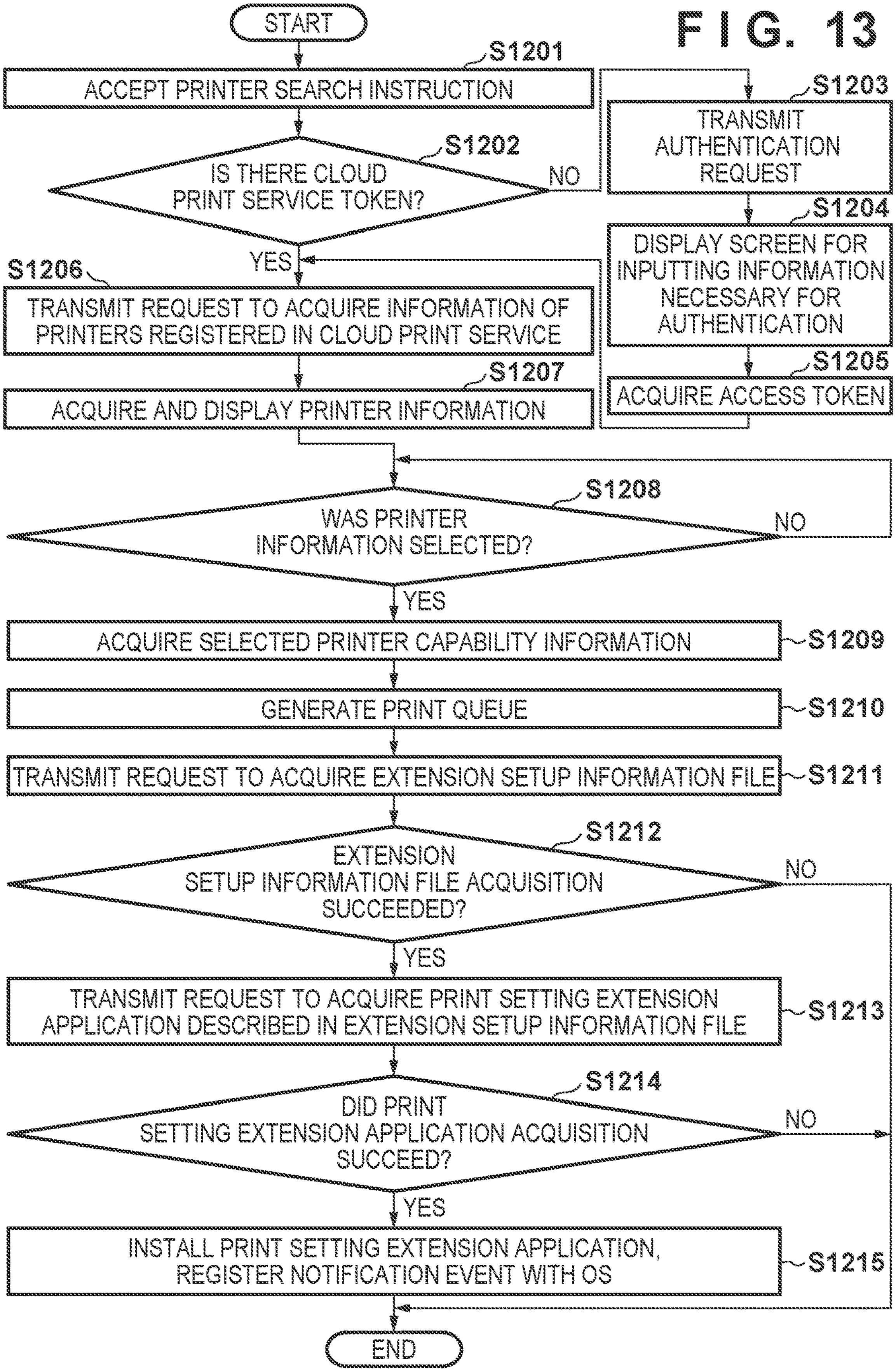

START
S1201
ACCEPT PRINTER SEARCH INSTRUCTION
S1202
IS THERE CLOUD PRINT SERVICE TOKEN?
NO
YES
S1203
TRANSMIT AUTHENTICATION REQUEST
S1204
DISPLAY SCREEN FOR INPUTTING INFORMATION NECESSARY FOR AUTHENTICATION
S1205
ACQUIRE ACCESS TOKEN
S1206
TRANSMIT REQUEST TO ACQUIRE INFORMATION OF PRINTERS REGISTERED IN CLOUD PRINT SERVICE
S1207
ACQUIRE AND DISPLAY PRINTER INFORMATION
S1208
WAS PRINTER INFORMATION SELECTED?
NO
YES
ACQUIRE SELECTED PRINTER CAPABILITY INFORMATION
S1209
GENERATE PRINT QUEUE
S1210
TRANSMIT REQUEST TO ACQUIRE EXTENSION SETUP INFORMATION FILE
S1211
S1212
EXTENSION SETUP INFORMATION FILE ACQUISITION SUCCEEDED?
NO
YES
TRANSMIT REQUEST TO ACQUIRE PRINT SETTING EXTENSION APPLICATION DESCRIBED IN EXTENSION SETUP INFORMATION FILE
S1213
S1214
DID PRINT SETTING EXTENSION APPLICATION ACQUISITION SUCCEED?
NO
YES
INSTALL PRINT SETTING EXTENSION APPLICATION, REGISTER NOTIFICATION EVENT WITH OS
S1215
END

FIG. 14

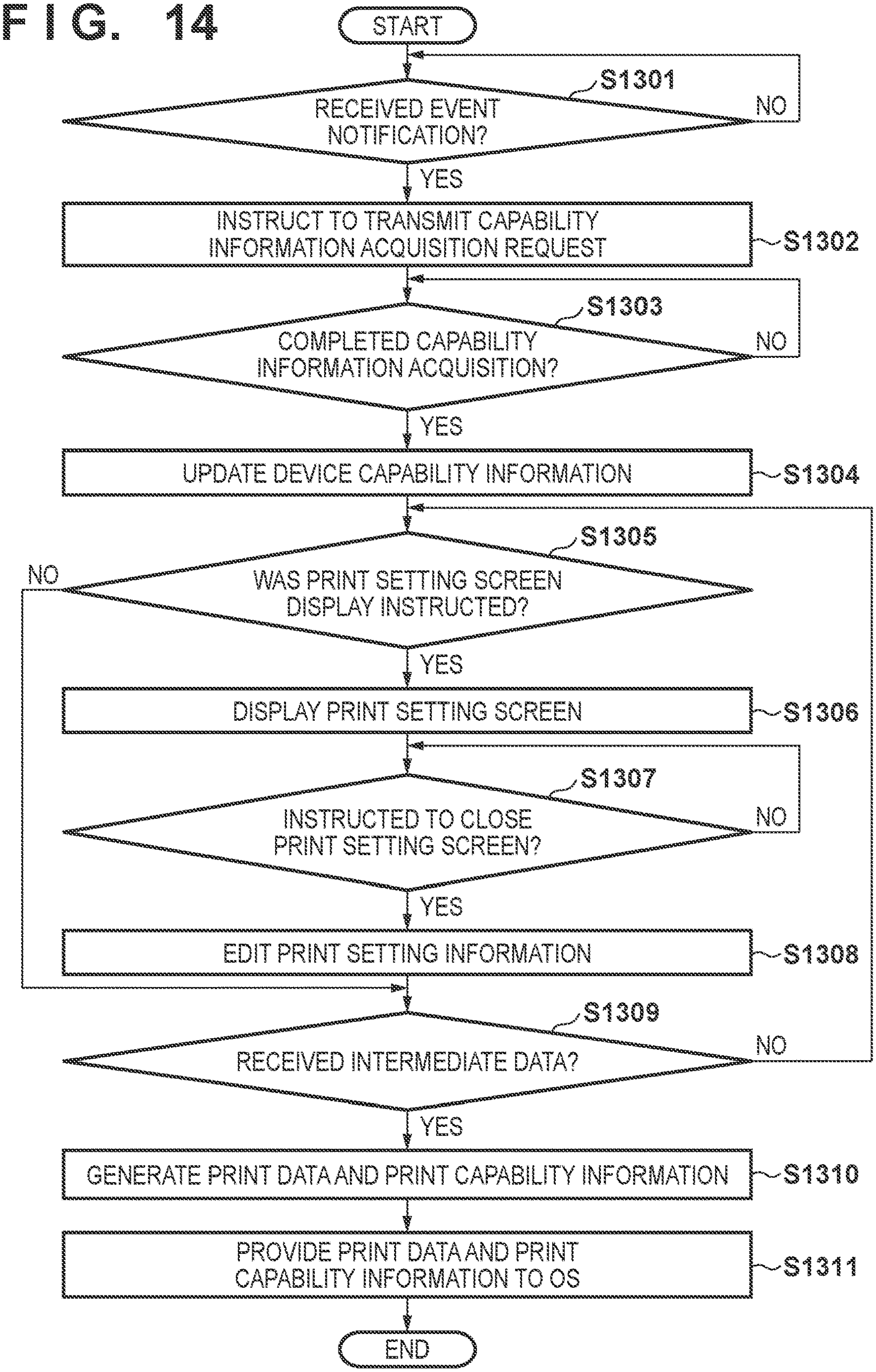

START
S1301
RECEIVED EVENT NOTIFICATION?
NO
YES
INSTRUCT TO TRANSMIT CAPABILITY INFORMATION ACQUISITION REQUEST
S1302
S1303
COMPLETED CAPABILITY INFORMATION ACQUISITION?
NO
YES
UPDATE DEVICE CAPABILITY INFORMATION
S1304
S1305
WAS PRINT SETTING SCREEN DISPLAY INSTRUCTED?
NO
YES
DISPLAY PRINT SETTING SCREEN
S1306
S1307
INSTRUCTED TO CLOSE PRINT SETTING SCREEN?
NO
YES
EDIT PRINT SETTING INFORMATION
S1308
S1309
RECEIVED INTERMEDIATE DATA?
NO
YES
GENERATE PRINT DATA AND PRINT CAPABILITY INFORMATION
S1310
PROVIDE PRINT DATA AND PRINT CAPABILITY INFORMATION TO OS
S1311
END

FIG. 15

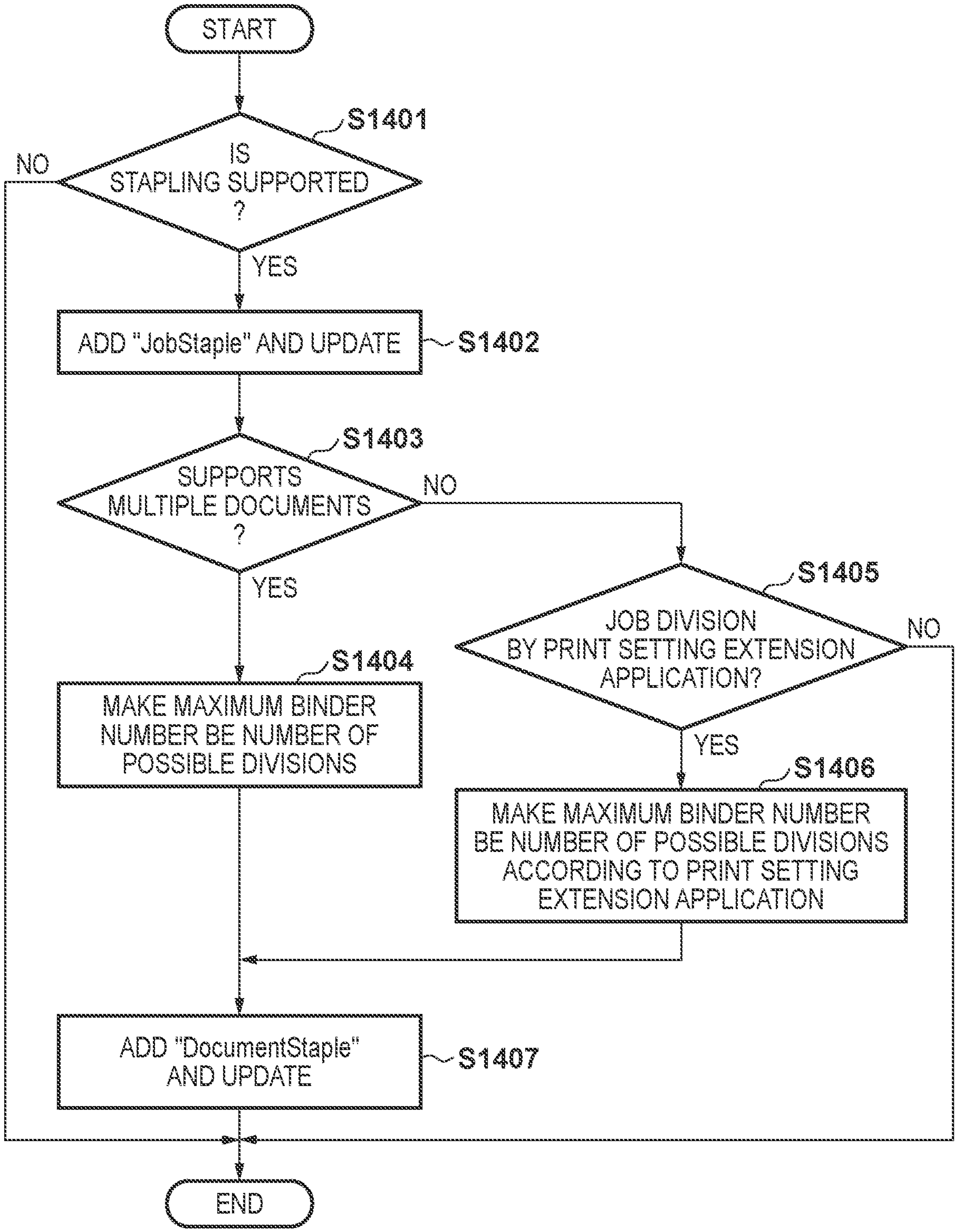

START
S1401
IS STAPLING SUPPORTED ?
NO
YES
ADD "JobStaple" AND UPDATE
S1402
S1403
SUPPORTS MULTIPLE DOCUMENTS ?
NO
YES
S1405
JOB DIVISION BY PRINT SETTING EXTENSION APPLICATION?
NO
YES
S1404
MAKE MAXIMUM BINDER NUMBER BE NUMBER OF POSSIBLE DIVISIONS
S1406
MAKE MAXIMUM BINDER NUMBER BE NUMBER OF POSSIBLE DIVISIONS ACCORDING TO PRINT SETTING EXTENSION APPLICATION
ADD "DocumentStaple" AND UPDATE
S1407
END

FIG. 16

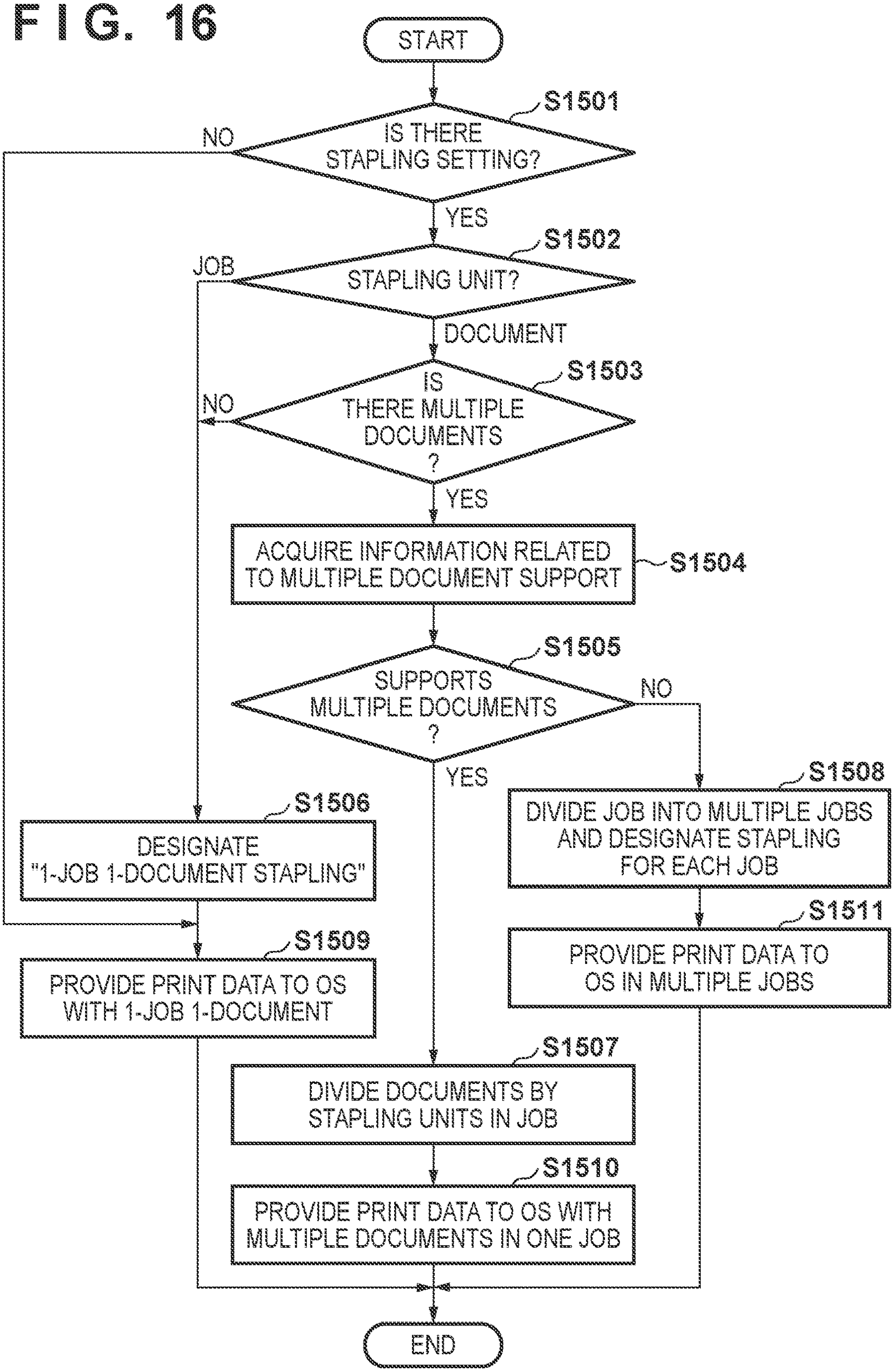
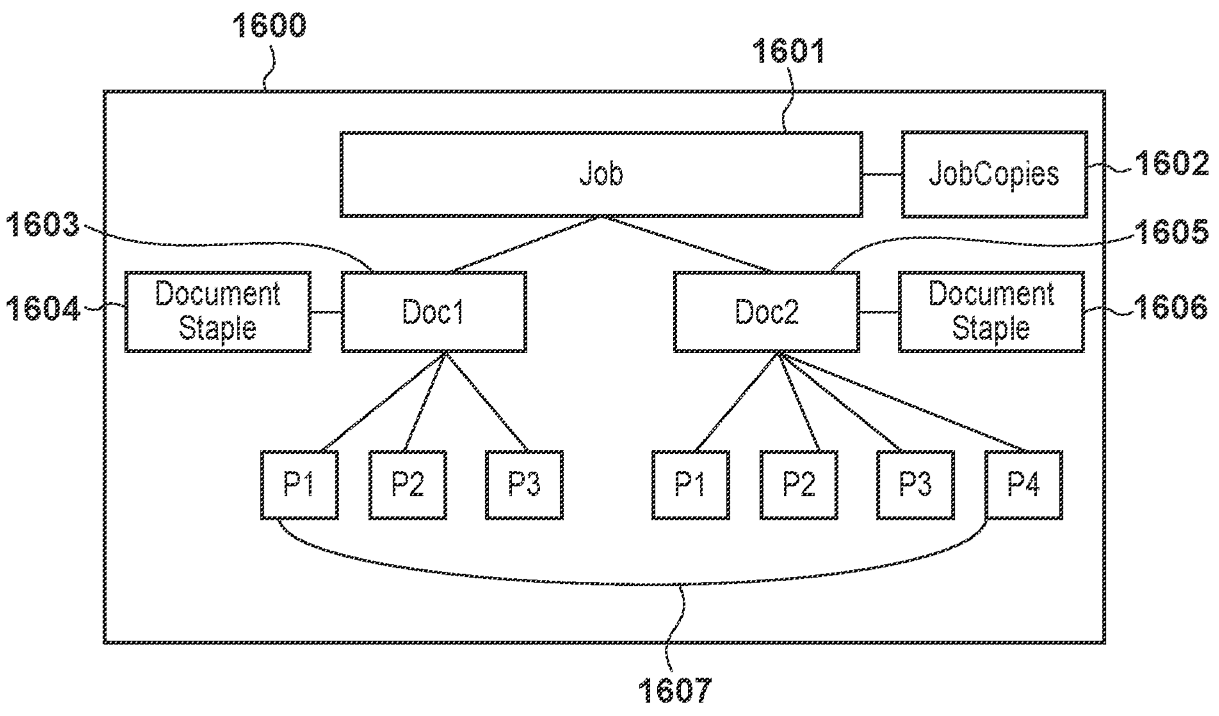

START
S1501
IS THERE STAPLING SETTING?
NO
YES
S1502
STAPLING UNIT?
JOB
DOCUMENT
S1503
IS THERE MULTIPLE DOCUMENTS ?
NO
YES
ACQUIRE INFORMATION RELATED TO MULTIPLE DOCUMENT SUPPORT
S1504
S1505
SUPPORTS MULTIPLE DOCUMENTS ?
NO
YES
S1506
DESIGNATE "1-JOB 1-DOCUMENT STAPLING"
S1508
DIVIDE JOB INTO MULTIPLE JOBS AND DESIGNATE STAPLING FOR EACH JOB
S1509
PROVIDE PRINT DATA TO OS WITH 1-JOB 1-DOCUMENT
S1511
PROVIDE PRINT DATA TO OS IN MULTIPLE JOBS
S1507
DIVIDE DOCUMENTS BY STAPLING UNITS IN JOB
S1510
PROVIDE PRINT DATA TO OS WITH MULTIPLE DOCUMENTS IN ONE JOB
END

FIG. 17


1600
1601
Job
JobCopies
1602
1603
1605
1604
Document Staple
Doc1
Doc2
Document Staple
1606
P1
P2
P3
P1
P2
P3
P4
1607

# INFORMATION PROCESSING APPARATUS, METHOD, AND NON-TRANSITORY COMPUTER-READABLE STORAGE MEDIUM STORING PROGRAM

## BACKGROUND OF THE INVENTION

### Field of the Invention

The present invention relates to an information processing apparatus capable to extending the function of a device driver, a method, and a non-transitory computer-readable storage medium storing a program.

### Description of the Related Art

In recent years, general-purpose printer drivers using an industry-standard protocol such as the Internet printing protocol (IPP) are known. As the general-purpose printer drivers, there exist a local printer driver directly connected to a printer, and a cloud printer driver that transmits print data to a cloud print service.

The general-purpose printer driver can communicate with printers of a plurality of printer vendors. For this reason, by using the general-purpose printer driver, a user can transmit print data to an image forming apparatus or a cloud print service without installing a printer driver unique to a printer vendor. Since the general-purpose printer driver handles print jobs to be printed by printers of various printer vendors, items and functions that can be set as print settings are limited. Also, in the general-purpose printer driver, printer capability information that can be acquired via the printer driver is similarly limited.

In Japanese Patent Laid-Open No. 2021-124791, when acquiring a driver extension package, the function of a print queue linked with a printer driver is extended using the identification information of a printer linked with the printer driver. There is also known an application that acquires capability information of a printer via a printer driver and performs print settings and printing.

## SUMMARY OF THE INVENTION

The present invention provides a mechanism that enables execution of a function according to a capability of a printer by an application.

The present invention in one aspect provides an information processing apparatus comprising an application configured to extend a function of a driver supporting a cloud print service, wherein the application comprises: a first acquisition unit configured to acquire capability information of a printer corresponding to the driver from the cloud print service if printing via the driver is performed; a display unit configured to display a setting screen corresponding to the capability information based on the capability information acquired by the first acquisition unit; a second acquisition unit configured to acquire intermediate data generated by software different from the application based on setting information of the setting screen; and a conversion unit configured to convert the intermediate data acquired by the second acquisition unit into data to be transmitted to the cloud print service.

According to the present invention, it is possible to execute a function according to a capability of a printer by an application.

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

FIG. **1** is a view showing the configuration of a print system;

FIGS. **2**A to **2**E are views showing the hardware configurations of apparatuses;

FIGS. **3**A and **3**B are sequence charts showing the sequence between the apparatuses;

FIG. **4** is a view showing a setting screen associated with a printer displayed by an OS;

FIG. **5** is a view showing capability information;

FIGS. **6**A and **6**B are views showing device capability information;

FIGS. **7**A to **7**D are views showing device capability information;

FIG. **8** is a view showing an extension setup information file;

FIGS. **9**A and **9**B are sequence charts showing the sequence between the apparatuses;

FIGS. **10**A to **10**D are views showing standard print setting screens mounted on the OS;

FIGS. **11**A to **11**E are views showing print setting screens displayed by a print setting extension application;

FIG. **12** is a view showing an UI screen of a print application;

FIG. **13** is a flowchart showing processing of the OS;

FIG. **14** is a flowchart showing processing of the print setting extension application;

FIG. **15** is a flowchart showing processing of the print setting extension application;

FIG. **16** is a flowchart showing processing of the print setting extension application; and

FIG. **17** is a view showing the configuration of intermediate data.

## DESCRIPTION OF THE EMBODIMENTS

Hereinafter, embodiments will be described in detail with reference to the attached drawings. Note, the following embodiments are not intended to limit the scope of the claimed invention. Multiple features are described in the embodiments, but limitation is not made an invention that requires all such features, and multiple such features may be combined as appropriate. Furthermore, in the attached drawings, the same reference numerals are given to the same or similar configurations, and redundant description thereof is omitted.

For a printer selected by a user for printing, a standard driver mounted on an OS in advance acquires printer capability information of setting items predetermined by the OS. Hence, even if the printer has a capability other than the setting items predetermined by the OS, the user cannot set it using the standard driver. For this reason, in an application that performs print settings and printing via a printer driver, it may be impossible to execute a predetermined function.

According to the present disclosure, it is possible to execute a function according to a capability of a printer by an application.

FIG. **1** is a view showing an example of the configuration of a print system in cloud print according to this embodiment. In the print system, a client terminal **101**, a cloud print server **102**, an application management server **103**, a cloud print supporting printer **104**, and an online support server

**105** are connected via a network **107**. The cloud print server **102** is a server apparatus that provides a cloud print service **321**. A cloud printer driver **311** for a cloud print service is installed in the client terminal **101**. In this embodiment, the cloud printer driver **311** is, for example, a standard driver mounted on an OS in advance.

In the print system according to this embodiment, a job generated by the cloud printer driver **311** is transferred to the cloud print service **321**. Then, printing is performed by the cloud print supporting printer **104** registered in the cloud print service **321**.

FIG. **1** shows one client terminal **101** and one cloud print supporting printer **104**, but there may be a plurality of client terminals **101** and a plurality of cloud print supporting printers **104**. Also, each of the cloud print server **102**, the application management server **103**, and the online support server **105** may be a server system formed by a plurality of information processing apparatuses. If each server is a server system formed by a plurality of information processing apparatuses, a load can be distributed to the plurality of information processing apparatuses. The cloud print server **102**, the application management server **103**, and the online support server **105** may virtually be formed in one physical information processing apparatus.

The network **107** is a wired network, a wireless network, or a network including both. In this embodiment, a WAN such as the Internet is assumed as the connection to the cloud print service. However, the network **107** may be a closed environment such as an in-house LAN.

The client terminal **101** is, for example, an information processing apparatus such as a PC, a tablet, or a smartphone, and is a terminal that can directly be operated by a user. On the client terminal **101**, arbitrary application software can be executed. Also, on the client terminal **101**, an OS **313** that is basic software, and a print setting extension application **312** and a print application **315** can be executed. The cloud print supporting printer **104** is a device that performs printing on a print medium such as a paper sheet, and is an image forming apparatus that converts image data received via the network **107** into print data and prints an image on a print medium.

The cloud print supporting printer **104** can receive, via the cloud print server **102**, print data generated by the cloud printer driver **311** of the client terminal **101**. Also, the cloud print supporting printer **104** can receive, without interposing the cloud print server **102**, print data generated by the cloud printer driver **311** of the client terminal **101** directly from the client terminal **101**.

The cloud print server **102** receives print data and a print instruction from the client terminal **101**. The cloud print server **102** then transmits the received print data and the print instruction to the cloud print supporting printer **104**.

The application management server **103** is a server apparatus that provides an application management service **331** configured to hold and manage various kinds of applications including the print setting extension application **312**. The application management server **103** receives identification information of an application and a download request of the application from the client terminal **101**. The application management server **103** transmits an application specified based on the received identification information to the client terminal **101**.

The online support server **105** is a server apparatus that provides an online support service **351**. The online support service **351** provides, to the client terminal **101**, an extension setup information file in which pieces of information used to extend the function of the client terminal **101** are described. The extension setup information file is, for example, a file whose extension is inf.

The hardware configuration of each apparatus in the system according to this embodiment will be described next with reference to FIGS. **2**A to **2**E. FIG. **2**A is a block diagram showing an example of the hardware configuration of the client terminal **101**. The client terminal **101** includes a display unit **216**, an operation unit **217**, a storage unit **214**, a control unit **211**, and a network communication unit **215**. The storage unit **214** is, for example, a nonvolatile storage device such as a hard disk or a solid state drive (SSD), and can store and rewrite digital data. The control unit **211** is configured to include a CPU **212** and a memory **213**, and comprehensively controls the operation of the entire client terminal **101**. The CPU **212** deploys a program stored in the storage unit **214** on the memory **213** and executes it, thereby, for example, implementing the operation of the client terminal **101** according to this embodiment. The memory **213** is the main storage memory of the CPU **212**, and is used as a work area or a temporary storage area used to deploy various kinds of programs.

The network communication unit **215** is a device that performs communication with the network **107**, and transmits/receives digital data to/from an external server or another client terminal via the network **107**. The display unit **216** is a device such as a liquid crystal display configured to display visual information to the user. The operation unit **217** is a device configured to accept an operation input from the user using a keyboard, a mouse, or the like. A device having the functions of both the display unit **216** and the operation unit **217**, like a touch panel, may be formed. The configuration of the client terminal **101** is not limited to the configuration shown in FIG. **2**A, and can appropriately include a configuration according to a function that the device used as the client terminal **101** can implement.

FIG. **2**B is a block diagram showing an example of the hardware configuration of the cloud print server **102**. The cloud print server **102** includes a storage unit **224**, a control unit **221**, and a network communication unit **225**. The storage unit **224** is, for example, a nonvolatile storage device such as a hard disk or an SSD, and can store and rewrite digital data. The control unit **221** is configured to include a CPU **222** and a memory **223**, and comprehensively controls the operation of the entire cloud print server **102**. The CPU **222** deploys a program stored in the storage unit **224** on the memory **223** and executes it, thereby, for example, implementing the operation of the cloud print server **102** according to this embodiment. The memory **223** is the main storage memory of the CPU **222**, and is used as a work area or a temporary storage area used to deploy various kinds of programs.

The network communication unit **225** is a device that performs communication with the network **107**, and transmits/receives digital data to/from an external server or a client terminal via the network **107**. The configuration of the cloud print server **102** is not limited to the configuration shown in FIG. **2**B, and can appropriately include a configuration according to a function that the device used as the cloud print server **102** can implement. Note that a description will be made assuming that the cloud print server **102** is formed by one information processing apparatus having the hardware configuration shown in FIG. **2**B. However, the cloud print server **102** may be formed by a plurality of information processing apparatuses shown in FIG. **2**B.

FIG. **2**C is a block diagram showing an example of the hardware configuration of the application management server **103**. The application management server **103** includes a display unit **236**, an operation unit **237**, a storage unit **234**, a control unit **231**, and a network communication unit **235**. The storage unit **234** is, for example, a nonvolatile storage device such as a hard disk or an SSD, and can store and rewrite digital data. The control unit **231** is configured to include a CPU **232** and a memory **233**, and comprehensively controls the operation of the entire application management server **103**. The CPU **232** deploys a program stored in the storage unit **234** on the memory **233** and executes it, thereby, for example, implementing the operation of the application management server **103** according to this embodiment. The memory **233** is the main storage memory of the CPU **232**, and is used as a work area or a temporary storage area used to deploy various kinds of programs.

The network communication unit **235** is a device that performs communication with the network **107**, and transmits/receives digital data to/from an external server or a client terminal via the network **107**. The configuration of the application management server **103** is not limited to the configuration shown in FIG. **2**C, and can appropriately include a configuration according to a function that the device used as the application management server **103** can implement. Note that a description will be made assuming that the application management server **103** is formed by one information processing apparatus having the hardware configuration shown in FIG. **2**C. However, the application management server **103** may be formed by a plurality of information processing apparatuses.

FIG. **2**D is a block diagram showing an example of the hardware configuration of the cloud print supporting printer **104**. The cloud print supporting printer **104** includes a display unit **246**, an operation unit **247**, a storage unit **244**, a control unit **241**, a network communication unit **245**, and a print unit **248**. The display unit **246** is a device configured to display information to the user, such as a touch panel or an LED equipped on the cloud print supporting printer **104**. The operation unit **247** is a device configured to accept an operation input from the user, and may include hard keys such as a ten-key pad in addition to a touch panel. The storage unit **244** is, for example, a nonvolatile storage device such as a hard disk or an SSD, and can store and rewrite digital data. The control unit **241** is configured to include a CPU **242** and a memory **243**, and comprehensively controls the operation of the entire cloud print supporting printer **104**. The CPU **242** deploys a program stored in the storage unit **244** on the memory **243** and executes it, thereby, for example, implementing the operation of the cloud print supporting printer **104** according to this embodiment. The memory **243** is the main storage memory of the CPU **242**, and is used as a work area or a temporary storage area used to deploy various kinds of programs.

The network communication unit **245** is a device that performs communication with the network **107**, and mainly receives print data or transmits information representing the state of the cloud print supporting printer **104**, such as an error, to an external apparatus such as a server. The print unit **248** is a device that executes print processing by performing a series of operations such as paper feed, printing, and discharge for a print medium such as print paper stored in a cassette or a tray. The printing method of the print unit **248** is not limited and, for example, an electrophotographic method or an inkjet printing method is used. A double-sided unit used at the time of discharge or a finishing device for stapling or punching may be included in the print unit **248**. Note that in this embodiment, as an example of the cloud print supporting printer **104**, a single function printer that performs only a print function will be described. However, a multi-function printer (MFP) having a scanner function, a FAX function, and the like may be used.

FIG. **2**E is a block diagram showing an example of the hardware configuration of the online support server **105**. In this embodiment, a description will be made assuming that the online support server **105** is formed by one information processing apparatus. However, the online support server **105** may be formed by a plurality of information processing apparatuses. The online support server **105** includes a display unit **256**, an operation unit **257**, a storage unit **254**, a control unit **251**, and a network communication unit **255**. The display unit **256** is a device such as a liquid crystal display configured to display visual information to the user. The operation unit **257** is a device configured to accept an operation input from the user using a keyboard, a mouse, or the like. A device having the functions of both the display unit **256** and the operation unit **257**, like a touch panel, may be formed. The storage unit **254** is, for example, a nonvolatile storage device such as a hard disk or an SSD, and can store and rewrite digital data. An extension setup information file that is a file which is provided to the client terminal **101** and in which pieces of information used to extend the function are described is stored in the storage unit **254**.

The control unit **251** is configured to include a CPU **252** and a memory **253**, and comprehensively controls the operation of the entire online support server **105**. The CPU **252** deploys a program stored in the storage unit **254** on the memory **253** and executes it, thereby, for example, implementing the operation of the online support server **105** according to this embodiment. The memory **253** is the main storage memory of the CPU **252**, and is used as a work area or a temporary storage area used to deploy various kinds of programs.

The network communication unit **255** is a device that performs communication with the network **107**, and transmits/receives digital data to/from an external server or a client terminal via the network **107**. For example, the online support server **105** receives, from the client terminal **101** via the network communication unit **255**, an acquisition request for the extension setup information file stored in the storage unit **254**. The online support server **105** then transmits a corresponding extension setup information file to the client terminal **101**.

An example of the sequence between the apparatuses or between the services according to this embodiment will be described next with reference to FIGS. **3**A and **3**B. FIGS. **3**A and **3**B shows the sequence after the cloud print supporting printer **104** is registered in the cloud print service **321** until the print setting extension application **312** is installed in the client terminal **101**. The sequence between the apparatuses will be described below as the sequence between the services.

First, the cloud print supporting printer **104** accepts, from the user, a printer registration operation for registering the cloud print supporting printer **104** in the cloud print service **321**. The cloud print supporting printer **104** transmits a printer registration request to the cloud print service **321** together with the device identification information of the printer (S**301**). Here, the device identification information transmitted to the cloud print service **321** is, for example, a hardware ID (HWID) assigned to each printer model. Note that the device identification information can be any information if it can identify the model of the printer.

Upon receiving the printer registration request, the cloud print service **321** transmits the URL of the cloud print service **321** for printer registration to the cloud print supporting printer **104**. If the user accesses from the cloud print supporting printer **104** or the information processing apparatus to the URL, an input screen used to input a user ID and a password is displayed on the display unit of the terminal that has accessed the URL. The user inputs the user ID and the password for using the cloud print service **321**, thereby logging in to the cloud print service **321**. If the login of the user succeeds, the cloud print service **321** transmits an acquisition request for information necessary for printer registration to the cloud print supporting printer **104**. In response to the request, the cloud print supporting printer **104** transmits printer information to the cloud print service **321**. The cloud print service **321** registers the printer information (device identification information and the like) of the cloud print supporting printer **104** and generates a print queue for the cloud print supporting printer **104**. At this time, the cloud print service **321** acquires the capability information of the cloud print supporting printer **104** and links it with the generated print queue. Capability information is information representing functions mounted on the printer, and indicates information necessary for the user to set as print settings at the time of printing, for example, whether double-sided printing is possible, whether color printing is possible, and whether stapling is possible.

FIG. **5** is a view showing an example of capability information of a printer. The capability information of a printer is configured to include item names and attribute values. The column on the left side of FIG. **5** shows item names, and the column on the right side shows attribute values. Item names correspond to the setting items of print settings. Attribute values correspond to set values, options, and ranges that can be set in the setting items. The cloud print supporting printer **104** stores item names and attribute values uniquely defined by printer vendors in addition to item names and attribute values defined as the industry-standard specifications by the Internet printing protocol (IPP). As the item names defined as the industry-standard specifications by the IPP, for example, item name "staple" and an attribute value (for example, none" or "upper left") representing where to staple are registered as the capability information of staple. Also, "multiple document handling" that is an item representing whether a plurality of documents in a job can be handled is registered together with attribute values "only one" and "on document basis". If "only one" is registered, even if a plurality of documents exist in a job, an operation is performed to handle the whole job as one document. For example, concerning staple, an operation of binding a plurality of documents together is performed. On the other hand, if "on document basis" is registered, an operation of stapling each of a plurality of documents is performed.

On the other hand, of the item names shown in FIG. **5**, for example, "maximum number of document divisions" and associated attribute values are item names uniquely defined by printer vendors. "Maximum number of document divisions" defines the maximum number of documents in a case where document is to be, for example, stapled in "multiple document handling". In addition to "maximum number of document divisions", "save job in printer", "abbreviate job name", "stapleless binding", and attribute values associated with these are item names and attribute values uniquely defined by printer vendors. "Save job in printer" is a setting item for setting whether print data that the printer receives from the cloud print service **321** should be saved in the printer even after printing. "Abbreviate job name" is an item for setting whether to abbreviate a name added to print data and display when the printer displays the bibliography information of print data that the printer receives from the cloud print service **321** on the display unit **246** of the printer. "Stapleless binding" is an item for setting whether to bind output sheets based on print data that the printer receives from the cloud print service **321** without using staples. Binding without using staples means that sheets are bound by, for example, pressure bonding. Note that as attribute values corresponding to item names defined as the industry-standard specifications, attribute values unique to the printer vendors may be defined. For example, "folding setting" is an item name defined by the IPP. On the other hand, "saddle folding" that is one of the attribute values of "folding setting" is a function of folding and discharging one or more sheets together without stapling these, and this is an attribute value uniquely defined by a printer vendor.

In this embodiment, the cloud print supporting printer **104** transmits capability information to the cloud print service **321** in accordance with the IPP that is a communication protocol. The cloud print supporting printer **104** registers the capability information using a command prepared for the cloud print supporting printer **104** to register capability information in the cloud print service **321**. The cloud print supporting printer **104** notifies the cloud print service **321** of the item names shown in FIG. **5** and attribute values and default values corresponding to the item names. Here, the capability information that the cloud print supporting printer **104** notifies is not associated with whether the items and the attribute values are defined by the IPP. For example, even concerning "maximum number of document divisions", "save job in printer", "abbreviate job name", and "stapleless binding" shown in FIG. **5**, the item names and the attribute values are notified to the cloud print service **321**. Also, "saddle folding" that is one of the attribute values of "folding setting" and is an attribute value unique to the printer vendor is also notified to the cloud print service **321** as one of the attribute values of "folding setting".

Installation of the print setting extension application **312** in the client terminal **101** will be described next. Installation of the print setting extension application **312** is executed when the user performs, on the client terminal **101**, a setup operation for printing by the cloud print supporting printer **104**. To register the cloud print supporting printer **104** in the client terminal **101**, a standard print function that is one of the functions of the operating system (OS) **313** of the client terminal **101** is used. The OS **313** accepts a printer adding operation that is one of the setup operations by the user (S**302**). The setup operation for printing by the cloud print supporting printer **104** is an operation accepted via, for example, a screen shown in FIG. **4**.

FIG. **4** shows a setting screen concerning a printer, which is displayed by the OS **313** of the client terminal **101**. If the user selects an object **401**, a printer search instruction is accepted by the OS **313**. The OS **313** that has accepted the printer search instruction determines whether an access token to the cloud print service **321** is held. Upon determining that no access token is held, the OS **313** displays a screen (not shown) configured to input user information (a login name and a password). The OS **313** transmits the user information input via the screen to the cloud print service **321**, and requests user authentication and an access token (S**303**).

The cloud print service **321** performs authentication processing using the user information received from the client terminal **101** (S**304**). If the authentication processing is completed, the cloud print service **321** notifies the client terminal **101** of the result of the authentication processing. Here, if the user authentication succeeds, the OS **313** acquires an access token from the cloud print service **321** (S**305**). On the other hand, if the user authentication fails, the cloud print service **321** notifies the client terminal **101** of an authentication error (S**306**). The OS **313** stops the processing based on the information of the received authentication error, and ends the processing shown in FIGS. **3**A and **3**B (S**307**). If the OS **313** holds an access token, or an access token is acquired in S**305**, the process advances to S**308**.

The OS **313** searches for printers registered in the cloud print service **321** and printers connected to the network **107**. The search of printers connected to the network **107** is search of devices by mDNS or Bonjour. The OS **313** transmits, to the cloud print service **321**, an acquisition request for printer information registered in the cloud print service **321**, thereby searching for printers (S**308**).

The cloud print service **321** that has received the printer information acquisition request transmits printer information to the client terminal **101** (S**309**). The printer information transmitted to the client terminal **101** in S**309** is information including printer names added to printers registered in the cloud print service **321** and device identification information (HWID) of the printers.

Upon acquiring the printer information transmitted from the cloud print service **321**, the OS **313** displays a printer list on the display unit **216** based on the printer information and printer information detected by searching the network **107**.

In a region **402** shown in FIG. **4**, the pieces of printer information received from the cloud print service **321** are displayed in a list. Of the printer information displayed in the region **402**, "Cloud Printer 001/002/003" are information of printers registered in the cloud print service **321**. On the other hand, "Printer XX" is a printer detected by the client terminal **101** searching the network **107**. Thus, the information of the printers acquired from the cloud print service **321** and the information of the printers detected by searching the network **107** are displayed in a list. Each printer information received from the cloud print service **321** is displayed with an icon **403** added thereto. On the other hand, each printer information detected by searching the network **107** is displayed with an icon **404** added thereto. This makes it possible to discriminately display the printer information received from the cloud print service **321** and the printer information detected by searching the network **107**. Note that only the information of the printers registered in the cloud print service **321** may be displayed.

Next, the user selects printer information corresponding to a printer to be registered in the client terminal **101** from the printer information displayed in the region **402**. The OS **313** inquires of the cloud print service **321** about the capability information of the printer corresponding to the selected printer information (S**310**). For which setting item the capability information should be inquired by the OS **313** is determined by the specifications of the OS **313**, and is set in the OS **313** in advance. The OS **313** designates setting items stored in advance and makes inquiry about capability information. The setting items stored in the OS **313** in advance are setting items defined as standard specifications by the IPP, and includes, for example, items "paper size", "paper type", and "color mode".

The cloud print service **321** returns the capability information of the cloud print supporting printer **104** to the OS **313** (S**311**). Note that in this embodiment, a description will be made assuming that the information registered in the cloud print service **321** in S**301** is transmitted to the client terminal **101** in S**311**. However, capability information registered in the cloud print service **321** at a timing other than described above may be transmitted to the client terminal **101**. For example, capability information registered in the cloud print service **321** in association with a change of the capability information of the cloud print supporting printer **104** may be transmitted to the client terminal **101**. Alternatively, the user may instruct updating of the capability information on a user interface provided by the cloud print service **321**, and the capability information updated in accordance with the instruction may be transmitted to the client terminal **101**. Otherwise, the cloud print service **321** may acquire capability information from the cloud print supporting printer **104** at the timing of S**310** and notify the client terminal **101** of the acquired capability information.

In S**311**, concerning the setting items designated from the client terminal **101**, the cloud print service **321** transmits attribute values and default values corresponding to the setting items. The attribute values transmitted here are all attribute values registered in the cloud print service **321** regardless of whether these attribute values are defined as standard. A default value is a value set first when the client terminal **101** displays a print setting screen. Note that if a response to the capability information inquired by the OS **313** of the client terminal **101** is not stored, the cloud print service **321** does not respond to the OS **313**.

Next, based on the device identification information and the printer name of the printer selected by the user, the OS **313** starts installing the cloud printer driver **311**. Then, the OS **313** generates a print queue of the cloud printer driver **311** that has basic device capability information and is packaged together in the OS **313** (S**312**). Device capability information indicates definition information necessary for generating print setting information of a printer driver, for example, information described in XML such as PrintDeviceCapabilites. FIGS. **6**A and **6**B are views showing an example of device capability information in an initial state, which is packaged together in the OS **313**. For example, "Feature" shows that "PageMediaSize" indicating a paper size is a setting item. "Option" indicates an option corresponding to "PageMediaSize". As the initial values of the device capability information, there are only two options "A4" and "LETTER" as paper sizes, as shown in FIGS. **6**A and **6**B. This information is stored in linkage with the print queue at the time of generation of the print queue, and managed by the OS **313**. Note that the device capability information in the initial state is fixed device capability information regardless of the information of the connected printer.

After that, using the capability information acquired from the cloud print service **321**, the OS **313** updates the device capability information forming the cloud printer driver **311**. FIGS. **7**A to **7**D are views showing an example of device capability information updated using the capability information acquired from the cloud print service **321**. For example, concerning the staple function, not only "Job Staple" for performing stapling for a whole job but also "DocumentStaple" for performing stapling on a document basis is added. Also, for "PageMediaSize" indicating the paper size, "Option" other than "A4" and "LETTER" is added as a paper size printable by the cloud print supporting printer **104**. Thus, the client terminal **101** first registers the cloud printer driver **311** and the device capability information packaged together in the OS **313** in the print queue in association with each other. The device capability information linked with the print queue is updated by the capability information acquired from the cloud print service **321**. At this time, the OS **313** updates the device capability information using only the attribute values defined by the industry-standard specifications in the capability information acquired from the cloud print service **321**. For this reason, for example, when acquiring capability information, even if an attribute value unique to a printer vendor is acquired as a paper type, the attribute value unique to the printer vendor is not added to the device capability information.

As described above, it is possible to set a print set value that is not set by the device capability information packaged together in the OS **313**.

The installation of the cloud printer driver **311** is thus completed. By performing the processing up to this point, print data can be transmitted from the client terminal **101** to the print queue for the cloud print supporting printer **104** generated in the cloud print service **321**.

Installation processing of the print setting extension application **312** that extends the function of the cloud printer driver **311** based on the selected printer information will be described next. Since the cloud printer driver **311** handles jobs to be printed by printers of various printer vendors, settable items and functions are limited. When the print setting extension application **312** is installed, the user can use a function unique to a printer vendor.

First, the OS **313** performs processing of adding identification additional information to the device identification information (HWID). This processing is processing necessary for acquiring an extension setup information file from the online support server **105**, and identification additional information is added such that a character string different from the device identification information is generated. In this embodiment, the OS **313** adds, to the device identification information, identification additional information indicating that it is an application corresponding to a printer. For example, "PrinterApp_" is added as identification additional information to the device identification information. Note that "PrinterApp_" is merely an example, and another character string, a number, or a symbol may be used. As the result of the above-described processing, for example, if the device identification information of the cloud print supporting printer **104** is "device001", the device identification information after the identification additional information adding processing is "PrinterApp_device001".

The OS **313** transmits, to the online support service **351**, a search request for an extension setup information file including the device identification information with the additional information as a target (S**313**). By S**313**, the online support service **351** is notified of "PrinterApp_device001" added with the identification additional information.

In the online support service **351**, an extension setup information file shown in FIG. **8** is stored. FIG. **8** shows an example of an extension setup information file. The extension setup information file is a file created by the printer vendor of the cloud print supporting printer **104** and registered in the online support service **351**.

In the extension setup information file, an application identifier used to identify a print setting extension application used for setting of print data to be sent to the cloud print supporting printer **104** is described. In the extension setup information file shown in FIG. **8**, an item "PackageFamilyName" is the identification information of the print setting extension application. On the other hand, in "PrinterHardwareID", a character string generated by adding identification additional information to the identification information of the cloud print supporting printer **104** is described.

Note that in the online support service **351**, an extension setup information file in which the identification information of the printer driver is stored in addition to the extension setup information file in which the identification information of the print setting extension application is described. In the extension setup information file in which the identifier of the printer driver is described, the identifier of the printer driver is described in "PackageFamilyName". Device identification information without identification additional information is described in "PrinterHardwareId".

As described above, in the online support service **351**, both the extension setup information file in which the identifier of the printer driver is described and the extension setup information file in which the identifier of the print setting extension application is described are stored. For this reason, the OS **313** adds identification additional information to the device identification information to appropriately acquire a necessary extension setup information file.

The online support service **351** that has received the search request specifies an extension setup information file whose "PackageFamilyName" in the file matches the device identification information with the identification additional information designated by the request.

As the result of the search, if the online support service **351** stores the extension setup information file including the device identification information as the target, the online support service **351** transmits the extension setup information file to the OS **313** (S**314**). At this time, the contents of the extension setup information file are written in a registry of the OS **313**.

Next, the OS **313** installs extension setup information described in the extension setup information file acquired from the online support service **351** in linkage with the print queue generated in S**312** (S**315**).

Next, the OS **313** extracts an application ID from the installed extension setup information (S**316**). The application ID is an identifier defined by "PackageFamilyName" in the extension setup information file. This is processing performed when the extension setup information file corresponding to the cloud print supporting printer **104** is stored in the online support service **351**.

As the result of the search, the online support service **351** may not store the extension setup information file including the device identification information as the target. At this time, the OS **313** completes the installation of the cloud printer driver **311**, and stops the application installation processing (S**317**). If the extension setup information file cannot be received within a predetermined time from the search request of the OS **313**, or if an error notification is received from the online support service **351**, the OS **313** executes the processing of S**317**.

From S**318**, processing performed when the extension setup information file can be acquired, and the application ID can be extracted in S**316** will be described.

The OS **313** requests the application management service **331** to search for an application whose ID matches the extracted application ID (S**318**). The application management service **331** stores an application that operates on the client terminal **101** and an application ID that is the identifier of the application in association with each other. The application and the application ID are registered in the application management service **331** by the printer vendor that provides the cloud print supporting printer **104**.

If the application management service **331** holds the print setting extension application **312** whose ID matches the requested application ID, the application management service **331** transmits the print setting extension application **312** to the client terminal **101** (S**319**). The print setting extension application **312** transmitted here is the application to which the same ID as the requested application ID is added.

The OS **313** installs the acquired print setting extension application **312** in association with the print queue on the side of the client terminal **101** (S**320**). The OS **313** stores, in a registry, the application ID as the information of the print queue. Also, the print setting extension application **312** does settings in the OS **313** such that the print queue linked with the application makes an event notification to the OS **313** at a predetermined timing. The installed print setting extension application **312** is activated after the client terminal **101** is powered on, and the OS **313** is activated, and operates as a background task after the activation.

If the application management service **331** does not hold the print setting extension application **312** whose ID matches the requested application ID, the OS **313** stops the installation processing of the application (S**321**). In this case, the generated print queue and the cloud printer driver **311** are installed in linkage, and the processing is ended without linking the print setting extension application **312** with the print queue.

Note that in the above description, a predetermined character string is added to the device identification information of the cloud print supporting printer **104**, and the extension setup information file is searched for. However, if the file for installation of the printer driver can be identified, the search may be performed without adding a predetermined character string.

An example of the sequence between the apparatuses or between the services according to this embodiment will be described next with reference to FIGS. **9**A and **9**B. FIGS. **9**A and **9**B show the sequence after the print queue created in S**312** of FIGS. **3**A and **3**B is selected until print data is transmitted to the cloud print service **321**. The sequence between the apparatuses will be described below as the sequence between the services. The print application **315** in FIGS. **9**A and **9**B is an application that displays a UI for print setting from the capability information of the printer, generates print data in accordance with selection of the user, and performs printing. The print application **315** is, for example, an application such as a document data creation application, a presentation data creation application, or a display application for photos and image data.

FIG. **12** is a view showing an example of an UI screen of the print application **315**. A UI screen **1101** shown in FIG. **12** is displayed when an instruction to open or newly create a document file is received, and the print application **315** is executed. An object **1102** indicates the name of the document file. An object **1103** indicates the contents in the document file. An object **1104** indicates a page. An object **1109** indicates thumbnail display of the text data of the document file. An object **1105** indicates a print queue selection control. The print queue selection control displays, as options, a list of printer drivers installed in the storage unit **214** and decides a printer to print in accordance with a user designation. An object **1111** indicates a print button. The print button requests, via the OS, a printer driver associated with the print queue of the printer selected by the object **1105** in accordance with a user instruction to perform print processing.

An object **1107** indicates an output paper size selection control. The device capability information shown in FIGS. **7**A to **7**D is acquired from the printer driver of the printer selected by the object **1105**, a list is created by referring to "psk:PageMediaSize", and an output paper size is decided in accordance with a user designation. An object **1108** is a staple control for setting a staple function. For the options of staple control as well, the device capability information shown in FIGS. **7**A to **7**D is acquired from the printer driver, and if "psk:JobStapleAllDocuments" exists, "whole job" is displayed as an option. If "psk:DocumentStaple" exists, "on chapter basis" is displayed as an option. A point to staple may be displayed as an option based on "psk:StapleTopLeft" (upper left) that is an option of "psk:JobStapleAllDocuments" or "psk:DocumentStaple". An object **1106** is a copy number control for setting a copy number.

FIG. **12** shows only controls corresponding to the output paper size and the staple function. However, the controls to be displayed are not limited to these. If the print setting extension application **312** is linked with the print queue, a control corresponding to a function described in the device capability information shown in FIGS. **7**A to **7**D can be displayed.

The object **1109** indicates thumbnail display of the document file. The thumbnail display is displayed while reflecting the output paper size selected by the object **1107**. An object **1110** is a button configured to display FIG. **11** that is the print setting screen of the printer driver selected by the object **1105**.

The procedure of setting at the time of printing and printing will be described below with reference to FIGS. **9**A and **9**B.

The print application **315** selects a print queue (S**801**). In this embodiment, assume that the cloud print supporting printer **104** is selected. Note that processing from S**801** is executed even if the user changes the printer to be used by the object **1105**.

Next, the OS **313** inquires of the queue on the cloud print service **321** corresponding to the cloud print supporting printer **104** about the capability information of the cloud print supporting printer **104** (S**802**). For which setting item the capability information should be inquired is determined by in advance the specifications of the OS **313**. For this reason, the capability information acquired at this timing is the same as that acquired in S**301** of FIGS. **3**A and **3**B. The inquiry is made for the cloud print service **321** using, for example, a command of a standard protocol defined by the IPP, like Get-print-Attributes. If Get-print-Attributes is used, capability information determined by the OS **313** is inquired in a list format.

Based on the list of capability information sent by Get-print-Attributes, the cloud print service **321** transmits the capability information of the cloud print supporting printer **104** to the OS **313** (S**803**). For example, assume that the attribute of a medium size is designated by Get-print-Attributes (IPP). If the attribute of the medium size is held, the cloud print service **321** transmits a value (A4, B5, Letter, or the like) linked with the attribute. If the attribute designated by Get-print-Attributes does not exist in the queue on the cloud print service **321** corresponding to the cloud print supporting printer **104**, the cloud print service **321** does not respond to the OS **313**.

Using the capability information acquired from the cloud print service **321**, the OS **313** updates device capability information. The OS **313** adds the capability information acquired in S**803** of FIG. **8** to the device capability information generated in S**312** of FIGS. **3**A and **3**B (S**804**). By the process of S**803**, the device capability information managed by the client terminal **101** is updated. Note that when updating the device capability information in S**804**, the device capability information is updated only concerning the attribute values defined by the industry-standard specifications.

Next, the OS **313** notifies the print setting extension application **312** of an event and an API to be used for editing of the device capability information (S**805**). Note that the event notification timing is the timing registered when the print setting extension application **312** is installed in the OS **313** of the client terminal **101**.

Upon receiving the event, the print setting extension application **312** requests the cloud print service **321** to acquire capability information. The acquisition of capability information here is performed to write setting items and attribute values uniquely defined by the printer vendor in the device capability information.

Upon receiving the event from the OS **313**, the print setting extension application **312** inquires, via the cloud print service **321**, about the capability information of the cloud print supporting printer **104** (S**806**). At this time, the print setting extension application **312** inquires of the cloud print service **321** about setting items unique to the printer vendor or capability information of setting items including attribute values unique to the printer vendor. The inquiry is performed using Get-print-Attributes, like S**802**, and capability information is acquired by designating, as item names, the item names of setting items that should be inquired. Note that in this embodiment, a description will be made assuming that in S**806**, capability information is acquired concerning setting items uniquely defined by the printer vendor or setting items including attribute values uniquely defined by the printer vendor. Note that even a setting item already acquired when capability information is acquired by the OS **313** may be acquired again.

If the inquiry of the capability information unique to the printer vendor is received from the print setting extension application **312**, the cloud print supporting printer **104** responds to the print setting extension application **312** via the cloud print service **321** (S**807**). The responding method here is the same as in S**311** of FIGS. **3**A and **3**B. In this embodiment, in S**807**, the cloud print service **321** returns the capability information of the cloud print supporting printer **104** stored in the cloud print service **321**. Note that upon receiving the request in S**806**, the cloud print service **321** may reacquire the capability information from the cloud print supporting printer **104** and return it to the client terminal **101**.

Upon acquiring the capability information from the cloud print supporting printer **104**, the print setting extension application **312** edits the device capability information managed by the OS **313** via a configuration information object. The configuration information object is a set of data groups necessary for editing device capability information. The print setting extension application **312** cannot directly edit the device capability information held by the OS **313**. For this reason, the print setting extension application **312** changes the device capability information held by the OS **313** using the configuration information object. Pieces of capability information such as "maximum number of document divisions", "stapleless binding", and "save job in printer" acquired in S**807** of FIG. **8** are converted into device capability information and added to the configuration information object, thereby editing the device capability information (S**808**). By performing the processing up to S**808**, setting items and attribute values unique to the printer vendor are stored in the device capability information in addition to the capability information concerning standard setting items acquired in response to the inquiry by the OS **313**.

Next, the print setting extension application **312** transfers the edited device capability information to the OS **313** (S**809**). The OS **313** stores the device capability information acquired from the print setting extension application **312** in linkage with the print queue.

After the device capability information is updated, the OS **313** enables an object serving as a trigger for displaying the print setting screen of the print setting extension application **312** (S**810**). The object serving as the trigger for displaying the print setting screen of the print setting extension application **312** is, for example, the button **1110** shown in FIG. **12**. Until the processing of S**810** is completed, the button **1110** is grayed out (disabled), and even if the user clicks it, the print setting screen of the print setting extension application **312** is not displayed. If the processing of S**810** is completed, gray-out of the button **1110** is canceled, and the user can select the button **1110**. The print application **315** requests the OS **313** to acquire the device capability information (S**811**). The OS **313** returns the device capability information of the cloud print supporting printer **104** to the print application **315** (S**812**). As described with reference to FIG. **12**, the print application **315** refers to the device capability information acquired in S**812**, and constructs and displays UIs for print setting, such as displays **1107** and **1108**. If the user selects the button **1110**, the print setting extension application **312** is activated, and a print setting screen as shown in FIGS. **11**A to **11**E is displayed (S**814**). The print setting screen shown in FIGS. **11**A to **11**E does not depend on the type of the print application **315**.

Note that if the print setting extension application **312** is not linked with the selected print queue, a standard print setting screen mounted on the OS **313** in advance, as shown in FIG. **10**A, is displayed. In the standard print setting screen, if pressing of an advanced setting button **901** is accepted, an advanced print setting screen shown in FIG. **10**B is displayed, and an advanced print setting screen configured to set setting items that cannot be displayed in FIG. **10**A is displayed. Note that the advanced print setting screen shown in FIG. **10**B can be scrolled by operating a scroll bar, and the user can do print settings for a plurality of setting items supported by the OS **313**, as shown in FIGS. **10**C and **10**D. Note that the user can store the set print settings and return to FIG. **10**A by selecting an OK button **902**. An apply button **903** shown in FIG. **10**A is a button for storing print settings, and a cancel button **904** is a button for returning to the screen shown in FIG. **12** without storing the print settings. If the user selects an OK button **905**, the print settings are stored, and the screen returns to the screen shown in FIG. **12**. Note that in FIGS. **10**A to **10**D, print setting items and attribute values uniquely defined by the printer vendor cannot be set.

The print setting extension application **312** receives print setting information generated based print setting capability information that the OS **313** generates from the device capability information, and displays an extended print setting screen shown in FIG. **11**A. The extended print setting screen can be scrolled by the user operating a scroll bar, as shown in FIGS. **11**A to **11**E, and the user can set the set values of various print setting items.

For example, the output paper size of a setting item **1001** in FIG. **11**A is print setting information generated from "psk:PageMediaSize" in FIGS. **7**A to **7**D. Also, "A4" that is an option of the output paper size is displayed by the print setting extension application **312** based on information "psk:IOSA4" in the print setting information. In this way, the print setting extension application **312** converts device capability information into set values and displays the extended print setting screen. Since the extended print setting screen is generated from the device capability information including capability information concerning setting items unique to the printer vendor, it is possible to set setting items and set values that cannot be set in the screens shown in FIGS. **10**A to **10**D provided by the OS **313**.

The user selects an object **1002** in the screen shown in FIGS. **11**A to **11**E displayed by the print setting extension application **312**. The object **1002** is an object configured to determine print settings. The print setting extension application **312** provides a function for arbitrarily changing print settings by the user, and if a print setting is changed, stores the set value. For example, assume that the user changes the output paper size from A4 to Letter on the UI. In this case, the print setting information held by the print setting extension application **312** is changed from A4 to Letter. If the object **1002** is selected, the print setting extension application **312** acquires, from the print setting screen, the print setting information processed in the control of the print setting screen and transfers the print setting information to the OS **313**. After the print setting information is transferred to the OS **313**, the print setting extension application **312** ends the display of the print setting screen shown in FIG. **11**A (S**815**). When the processing of S**815** is completed, the print application **315** receives the updated print setting information, and reflects it on the objects **1106**, **1107**, and **1108** that are controls for print setting of the print application **315** (S**816**). For example, if the output paper size is changed from A4 to Letter, as described above, the object **1107** is also changed from A4 to Letter.

If the user selects the object **1111** in the screen shown in FIG. **12**, the print application **315** generates intermediate data (S**817**). Next, the print application **315** outputs a print instruction to the OS **313**, and the OS **313** executes processing associated with printing based on the instruction input via the print application **315** (S**818**).

If execution of printing is instructed, the OS **313** transfers the intermediate data to the print setting extension application **312** (S**819**). Intermediate data is data generated before conversion to print data such as PDL, and is, for example, XPS data. Print setting information (PrintTicket) is also included in the intermediate data.

FIG. **17** is a view showing an example of the configuration of intermediate data. A job **1601** represents the layer of a job in intermediate data **1600**. A print setting **1602** is a print setting associated with the layer of the job, and the number of copies is set in FIG. **17**. Documents **1603** and **1605** represent the layer of documents that form the job **1601**. Print settings **1604** and **1606** represent print settings associated with the documents. In FIG. **17**, a print setting for performing stapling on a document basis is associated. Pages **1607** represent pages that form the documents **1603** and **1605**. In this embodiment, the intermediate data is generated by the print application **315**. If the print application **315** generates intermediate data, the object **1102** representing the layer of the document file corresponds to the layer of the job, and the object **1103** representing the layer of the chapters corresponds to the layer of the documents. Also, when outputting a print instruction to the OS **313**, the print application **315** may transfer data in a format different from the intermediate data. In this case, the OS **313** generates intermediate data. Other formats are, for example, GDI (drawing data) and print settings (DEVMODE).

Upon receiving the intermediate data from the OS **313**, the print setting extension application **312** generates print data based on the intermediate data, and generates print capability information based on the print setting information included in the intermediate data (S**820**). Print data is, for example, PDL data, like a PDL file, and the print capability information is, more specifically, information that describes print setting information by attribute values defined by the IPP. The print setting extension application **312** transfers the generated print data and print capability information to the print queue of the OS **313** (S**821**).

Processing of S**819** to S**821** is processing in a case where the print setting extension application **312** linked with the print queue is installed in the client terminal **101**. If the print setting extension application **312** is not installed in the client terminal **101**, the client terminal **101** executes processing of S**822**. That is, the OS **313** generates intermediate data, edits the page layout, converts the intermediate data into a predetermined format, and generates print data and print capability information (S**822**). Here, the predetermined format is, for example, PDF, PWG-Raster, or the like.

The OS **313** transmits the print data and the print capability information transferred from the print setting extension application **312** or the print data and the print capability information generated by the OS **313** to the cloud print service **321** via the print queue (S**823**). The cloud print service **321** transmits the print data and the print capability information transferred from the client terminal **101** to the cloud print supporting printer **104** (S**824**). Note that in this embodiment, upon receiving the print data and the print capability information, the cloud print service **321** transmits the received print data and print capability information to the cloud print supporting printer **104**. The cloud print supporting printer **104** may periodically makes inquiry to the cloud print service **321** and acquire unprinted print data and print capability information corresponding to the print data.

As described above, print data generated based on device capability information updated by the print setting extension application **312** can be transmitted to the cloud print supporting printer **104** via the cloud print service **321**.

FIG. **13** is a flowchart showing processing of the OS **313** until the print setting extension application **312** is installed in the client terminal **101**. The processing shown in FIG. **13** is implemented by, for example, the CPU **212** of the client terminal **101** reading out a program stored in the storage unit **214** and executing it. The processing shown in FIG. **13** is a flowchart executed by the OS **313**.

The CPU **212** displays the screen shown in FIG. **4** and accepts a printer search instruction (step S**1201**). For example, if the user selects the object **401** in FIG. **4**, the CPU **212** accepts a printer search instruction. The processing of step S**1201** corresponds to the processing of S**302** in FIGS. 3A and 3B.

The CPU **212** determines whether an access token of the cloud print service **321** is stored (step S**1202**). The client terminal **101** stores an access token for acquiring information from the cloud print service **321** for each user who logs in to the client terminal **101**. The CPU **212** determines whether an access token linked with the user who has logged in to the client terminal **101** is stored. Upon determining that the access token is stored, the process advances to step S**1206**. Upon determining that the access token is not stored, the CPU **212** transmits an authentication request to the cloud print service **321** (step S**1203**). The CPU **212** then receives, from the cloud print service **321**, a URL for displaying a screen to input information necessary for the authentication. The CPU **212** accesses the received URL to display a screen to input information necessary for the authentication (step S**1204**). The information necessary for the authentication includes, for example, a user ID (user identifier) and a password. The CPU **212** transmits the input information necessary for the authentication to the cloud print service **321**, and acquires an access token (step S**1205**). The processing of step S**1205** corresponds to the processing of S**305** in FIGS. 3A and 3B. Note that if the authentication in the cloud print service **321** fails, the CPU **212** cannot acquire the access token and ends the processing shown in FIG. **13**.

Using the access token, the CPU **212** transmits, to the cloud print service **321**, an acquisition request for the information of printers registered in the cloud print service **321** (step S**1206**). The processing of step S**1206** corresponds to the processing of S**308** in FIGS. **3**A and **3**B. The cloud print service **321** acquires the information of printers usable by the user who is identified by the received access token, and transmits the information to the client terminal **101**. For example, printer names registered in linkage with the printers usable by the user who is identified by the access token received from the client terminal **101** and the HWIDs of the printers are transmitted to the client terminal **101**.

The CPU **212** displays the information of printers acquired from the cloud print service **321** on the display unit **216** of the client terminal **101** (step S**1207**). By the display in step S**1207**, the pieces of information of printers are displayed in a list in the region **402** shown in FIG. **4**.

The CPU **212** determines whether the information of a printer is selected in the region **402** (step S**1208**). The CPU **212** repeats the processing of step S**1208** until the information of a printer is selected. If the information of a printer is selected, the process advances to step S**1209**.

The CPU **212** transmits, to the cloud print service **321**, an acquisition request for the capability information of the printer selected in the region **402** (step S**1209**). The processing of step S**1209** corresponds to the processing of S**310** in FIGS. **3**A and **3**B. Here, inquiry is performed for the cloud print service **321** concerning setting items registered in the OS **313** in advance.

The CPU **212** updates the device capability information of the printer stored in the client terminal **101** based on the capability information acquired from the cloud print service **321**, and generates a print queue (step S**1210**). The processing of step S**1210** corresponds to the processing of S**312** in FIGS. **3**A and **3**B.

The CPU **212** transmits an acquisition request for an extension setup information file to the online support service **351** (step S**1211**). The acquisition request includes the HWID of the printer.

The CPU **212** determines whether the acquisition of the extension setup information file succeeds (step S**1212**). Upon determining that the acquisition of the extension setup information file succeeds, the process advances to step S**1213**. Upon determining that the acquisition of the extension setup information file fails, the processing shown in FIG. **12** is ended.

The CPU **212** transmits, to the application management service **331**, an acquisition request for a print setting extension application described in the acquired extension setup information file (step S**1213**). The processing of step S**1213** corresponds to the processing of S**318** in FIGS. **3**A and **3**B. The CPU **212** acquires the application identifier of the print setting extension application from the extension setup information file, designates the acquired application identifier, and transmits an acquisition request for the print setting extension application to the application management service **331**.

The CPU **212** determines whether the acquisition of the print setting extension application succeeds (step S**1214**). Upon determining that the acquisition of the print setting extension application fails, the processing shown in FIG. **12** is ended. Upon determining that the acquisition of the print setting extension application succeeds, the process advances to step S**1215**.

The CPU **212** installs the acquired print setting extension application and registers the application identifier of the print setting extension application in linkage with the print queue (step S**1215**). The processing of step S**1215** corresponds to the processing of S**320** in FIGS. **3**A and **3**B. Furthermore, the CPU **212** registers, in the OS **313**, an event representing the timing of notification. Here, the CPU **212** performs registration such that the print setting extension application **312** is notified of an event if the print queue linked with the print setting extension application is selected in the print setting screen displayed by the print application **315**.

Next, processing of doing print settings and generating print data, which is executed by the installed print setting extension application **312**, will be described with reference to FIG. **14**. The processing shown in FIG. **14** is implemented by, for example, the CPU **212** of the client terminal **101** reading out a program stored in the storage unit **214** and executing it. The processing shown in FIG. **14** is a flowchart executed by the print setting extension application **312**.

The CPU **212** determines whether an event notification is received (step S**1301**). The event is an event issued by the OS **313**, and the event is notified to the print setting extension application **312** at the timing registered in step S**1215** of FIG. **13**. Upon determining that the event notification is not received, the CPU **212** repeats the processing of step S**1301**. Upon determining that the event notification is received, the process advances to step S**1302**.

The CPU **212** transmits an acquisition request for capability information to the cloud print service **321** (step S**1302**). Concerning setting items set in the print setting extension application **312**, the CPU **212** transmits the acquisition request for capability information to the cloud print service **321**. Here, capability information for setting items that cannot be acquired in step S**1207** of FIG. **13** is acquired. The processing of step S**1302** corresponds to the processing of S**806** in FIGS. **9**A and **9**B.

The CPU **212** determines whether the acquisition of capability information is completed (step S**1303**). Upon determining that the acquisition of capability information is not completed, the CPU **212** repeats the processing of step S**1303**. Upon determining that the acquisition of capability information is completed, the process advances to step S**1304**.

The CPU **212** updates the device capability information by the acquired capability information (step S**1304**). By performing the processing of step S**1304**, capability information for the setting items that are not acquired by the OS **313** can be stored in the client terminal **101**. The processing of step S**1304** corresponds to the processing of S**808** and S**809** in FIGS. **9**A and **9**B.

The CPU **212** determines whether a display instruction from the user for the print setting screen by the print setting extension application **312** is accepted (step S**1305**). The display instruction for the print setting screen by the print setting extension application **312** is, for example, an instruction issued based on a user selection operation of the object **1110** in FIG. **12**. Upon determining that the display instruction for the print setting screen is not accepted, the process advances to step S**1309**. Upon determining that the display instruction for the print setting screen is accepted, the process advances to step S**1306**.

The CPU **212** displays the print setting screen shown in FIG. **11**A based on the device capability information updated in step S**1304** (step S**1306**). The CPU **212** accepts a user operation for selecting a set value via the displayed print setting screen.

The CPU **212** determines whether an instruction for ending the display of the print setting screen by the print setting extension application **312** is accepted (step S**1307**). Upon determining that the instruction for ending the display of the print setting screen is not accepted, the CPU **212** repeats the processing of step S**1307**. Upon determining that the instruction for ending the display of the print setting screen is accepted, the process advances to step S**1308**.

The CPU **212** edits the print setting information by the set value selected in the print setting screen by the print setting extension application **312** (step S**1308**). The CPU **212** then ends the display of the print setting screen by the print setting extension application **312**. The processing of step S**1308** corresponds to the processing of S**815** in FIGS. **9**A and **9**B.

The CPU **212** determines whether the print setting extension application **312** receives intermediate data from the OS **313** (step S**1309**). Upon determining that the intermediate data is not received, the CPU **212** repeats the processing from step S**1305**. Upon determining that the intermediate data is received, the process advances to step S**1310**. The intermediate data is, for example, XPS data. Note that the print setting information may be included in the intermediate data.

The CPU **212** generates print data based on the intermediate data received by the print setting extension application **312**, and generates print capability information based on the print setting information received by the print setting extension application **312** (step S**1310**). The processing of step S**1310** corresponds to the processing of S**820** in FIGS. **9**A and **9**B. The CPU **212** generates print data of a predetermined format, for example, PDL data, like a PDL file, based on the intermediate data. Also, the CPU **212** generates print capability information described by the attribute values defined by the IPP based on the print setting information. In the print capability information, values can freely be described in addition to the attribute values defined by the IPP. Hence, concerning the setting items and the attribute values uniquely defined by the printer vendor, the CPU **212** can describe the values as the print capability information.

The CPU **212** provides the generated print data to the OS **313** (step S**1311**). The processing of step S**1311** corresponds to the processing of S**821** in FIGS. **9**A and **9**B. The OS **313** transmits the print data and the print capability information received via the print queue to the cloud print service **321**.

Details of the processing of updating the device capability information in step S**1304** of FIG. **14** will be described with reference to FIG. **15**. The processing shown in FIG. **15** is implemented by, for example, the CPU **212** of the client terminal **101** reading out a program stored in the storage unit **214** and executing it. The processing shown in FIG. **15** is a flowchart executed by the print setting extension application **312**. Note that details of processing of updating device capability information associated with a staple function will be described below as an example.

The CPU **212** refers to the item of staple in the capability information acquired in step S**1302** of FIG. **14** and determines whether a staple function exists (step S**1401**). Upon determining that a staple function exists, the process advances to step S**1402**. Upon determining that a staple function does not exist, the processing shown in FIG. **15** is ended.

Upon determining that a staple function exists, in addition to an acquired attribute value, the CPU **212** adds the staple function for the whole job to the device capability information to update it (step S**1402**). For example, as shown in FIGS. **7**A to **7**D, "psk:JobStapleAllDocuments" is described, and psk:StapleTopLeft that is a position to staple is described as a settable value.

The CPU **212** refers to the item of multiple document handling in the capability information acquired in step S**1302**, and determines whether finishing such as staple on a document basis is possible (step S**1403**). Upon determining that finishing on a document basis is possible, the process advances to step S**1404**. Upon determining that finishing on a document basis is not possible, the process advances to step S**1405**.

Upon determining that finishing on a document basis is possible, the CPU **212** refers to item of the maximum number of document divisions in the capability information acquired in step S**1302**, and adds and updates a multi-binder number in the device capability information (step S**1404**). For example, as shown in FIGS. **7**A to **7**D, "ns0000:MultiBinderNumber" is described, and a minimum value "1" and a maximum number (for example, 50) are described.

If a plurality of documents exist in the job, and it is determined that finishing such as staple on a document basis is not possible, the CPU **212** determines whether to divide the job by the print setting extension application **312** (step S**1405**). Here, whether to divide the job may be decided, for example, uniquely for each model, or may be set by the user. Upon determining to divide the job by the print setting extension application **312**, the process advances to step S**1406**. Upon determining not to divide the job by the print setting extension application **312**, the processing shown in FIG. **15** is ended.

Upon determining to divide the job by the print setting extension application **312**, the CPU **212** sets the number of jobs that the print setting extension application **312** can divide to the maximum value of multi-binder, and adds and updates the multi-binder number in the device capability information (step S**1406**). For example, as shown in FIGS. **7**A to **7**D, "ns0000:MultiBinderNumber" is described, and a minimum value "1" and a maximum number are described. For example, if the print setting extension application **312** can divide a job into 100 jobs, 100 is described as the maximum number.

After steps S**1404** and S**1406**, in addition to an acquired attribute value, the CPU **212** adds the staple function on a document basis to the device capability information to update it (step S**1407**). For example, as shown in FIGS. **7**A to **7**D, "psk:DocumentStaple" is described, and psk:StapleTopLeft that is a position to staple is described as a settable value. After step S**1407**, the processing shown in FIG. **15** is ended.

Details of the print data generation processing in steps S**1310** and S**1311** of FIG. **14** will be described with reference to FIG. **16**. The processing shown in FIG. **16** is implemented by, for example, the CPU **212** of the client terminal **101** reading out a program stored in the storage unit **214** and executing it. The processing shown in FIG. **16** is a flowchart executed by the print setting extension application **312**. Note that details of print data generation processing associated with a staple function will be described below as an example.

The CPU **212** refers to the print setting information and determines whether a staple setting exists (step S**1501**). Upon determining that a staple setting does not exist, the process advances to step S**1509**. Upon determining that a staple setting exists, the process advances to step S**1502**.

Upon determining that a staple setting exists, the CPU **212** refers to the print setting information and determines whether the unit of staple is whole job or document basis (step S**1502**). Upon determining that the unit of staple is whole job, the process advances to step S**1506**. Upon determining that the unit of staple is document basis, the process advances to step S**1503**.

Upon determining that the unit of staple is document basis, the CPU **212** refers to the intermediate data and determines whether a plurality of documents exist in the job (step S**1503**). Upon determining that a plurality of documents exist, the process advances to step S**1504**. Upon determining that a plurality of documents do not exist, the process advances to step S**1506**.

Upon determining that a plurality of documents exist, the CPU **212** refers to the capability information acquired in step S**1302** and acquires information representing whether the printer can handle a plurality of documents for each job (step S**1504**). The CPU **212** refers to the information acquired in step S**1504** and determines whether the printer can handle a plurality of documents (step S**1505**). Upon determining that the printer can handle a plurality of documents for each job, the process advances to step S**1507**. Upon determining that the printer cannot handle a plurality of documents for each job, the process advances to step S**1508**.

In step S**1506**, the CPU **212** generates print data in a format of 1-job 1-document, and based on the print setting information, generates print capability information described by attribute values defined by the IPP such that staple is performed. In step S**1509**, the CPU **212** provides, to the OS **313**, the print data including a staple setting as the print capability information and including one document. In step S**1509**, for example, if the method of providing the print data to the OS **313** complies with the IPP, the CPU **212** generates the print capability information including the staple setting by Create-Job Request. After that, the CPU **212** provides print data generated from the intermediate data to the OS **313** by Send-Document. After step S**1509**, the processing shown in FIG. **16** is ended.

In step S**1507**, the CPU **212** generates print data in a format of 1-job multiple-document, and based on the print setting information, generates print capability information described by attribute values defined by the IPP such that staple is performed. In step S**1510**, the CPU **212** provides, to the OS **313**, the print data including a staple setting as the print capability information and including a plurality of documents existing in one job. In step S**1510**, for example, if the method of providing the print data to the OS **313** complies with the IPP, the CPU **212** generates the print capability information including the staple setting on a document basis by Create-Job Request. After that, the CPU **212** repeats Send-Document as many times as the number of divisions, thereby providing the print data generated from the intermediate data to the OS **313**. After step S**1510**, the processing shown in FIG. **16** is ended.

In step S**1508**, the CPU **212** divides the job for each document to generate print data in a format of each job 1-document, and generates print capability information described by attribute values defined by the IPP such that staple is performed in each job. In step S**1511**, the CPU **212** provides, to the OS **313**, the print data including a staple setting as the print capability information and including one document existing in one job. In step S**1511**, for example, if the method of providing the print data to the OS **313** complies with the IPP, the CPU **212** generates the print capability information including the staple setting on a document basis by Create-Job Request. After that, the CPU **212** repeats the processing from Create-Job Request of job generation to Send-Document of document transmission as many times as the number of divisions, thereby providing the print data to the OS **313**. After step S**1511**, the processing shown in FIG. **16** is ended.

As described above, according to this embodiment, when selecting the print queue linked with the standard driver mounted on the OS in advance and transmitting print data and print capability information to the cloud print service, print setting information unique to a printer vendor can be used.

## Other Embodiments

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.

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.

This application claims the benefit of Japanese Patent Application No. 2022-169398, filed Oct. 21, 2022, which is hereby incorporated by reference herein in its entirety.

What is claimed is:

**1**. An information processing apparatus, comprising:

one or more memories configured to store an application configured to extend a function of a driver supporting a cloud print service; and

one or more processors configured to execute the application stored in the one or more memories to implement:

a first acquisition unit configured to acquire capability information of a printer corresponding to the driver from the cloud print service if printing via the driver is performed;

a display unit configured to display a setting screen corresponding to the capability information based on the capability information acquired by the first acquisition unit;

- a second acquisition unit configured to acquire intermediate data generated by software different from the application configured to extend the function of the driver supporting the cloud print service, the intermediate data having been generated based on setting information of the displayed setting screen corresponding to the capability information of the printer corresponding to the driver from the cloud print service; and
- a conversion unit configured to convert the intermediate data, generated based on the setting information of the displayed setting screen corresponding to the capability information of the printer corresponding to the driver from the cloud print service, acquired by the second acquisition unit into data to be transmitted to the cloud print service.

**2**. The apparatus according to claim **1**, wherein the one or more processors are configured to execute the application stored in the one or more memories to further implement a providing unit configured to provide the setting information to the software,

- wherein the second acquisition unit acquires the intermediate data generated by the software based on the setting information provided by the providing unit.

**3**. The apparatus according to claim **1**, wherein the data to be transmitted to the cloud print service includes print data and print capability information.

**4**. The apparatus according to claim **3**, wherein the print data is PDL data.

**5**. The apparatus according to claim **3**, wherein the print capability information is information in which the setting information is described by an attribute value defined by Internet printing protocol (IPP).

**6**. The apparatus according to claim **1**, wherein the software different from the application is a print application.

**7**. The apparatus according to claim **6**, wherein the second acquisition unit acquires, via an operating system, the intermediate data generated by the print application.

**8**. The apparatus according to claim **1**, wherein

- the software different from the application is an operating system, and the operating system holds definition information necessary for generating print setting information of the driver,
- the first acquisition unit acquires the capability information of the printer corresponding to the driver from the cloud print service based on a first notification from the operating system, and
- the first notification is performed based on selection of the driver.

**9**. The apparatus according to claim **8**, wherein the one or more processors are configured to execute the application stored in the one or more memories to further implement an updating unit configured to update the definition information based on the capability information acquired by the first acquisition unit.

**10**. The apparatus according to claim **9**, wherein the capability information acquired by the first acquisition unit includes information representing whether staple on a document basis in a job is possible.

**11**. The apparatus according to claim **10**, wherein the updating unit updates the definition information concerning a binder number based on the information representing whether staple on a document basis in the job is possible.

**12**. The apparatus according to claim **10**, wherein

- the data to be transmitted to the cloud print service includes print data and print capability information, and
- the conversion unit converts, based on the information representing whether staple on a document basis in the job is possible, the intermediate data acquired by the second acquisition unit into the print data in which a job and a document are associated.

**13**. The apparatus according to claim **9**, wherein the display unit displays the setting screen based on a second notification from the operating system.

**14**. The apparatus according to claim **13**, wherein the second notification is performed based on acceptance of an instruction for displaying a screen to do an advanced setting in a print setting screen displayed by a print application different from the application.

**15**. The apparatus according to claim **14**, wherein the print setting screen is displayed based on the definition information updated by the updating unit.

**16**. The apparatus according to claim **1**, wherein the driver is a standard driver mounted on an operating system in advance.

**17**. The apparatus according to claim **1**, wherein the one or more processors are configured to execute the application stored in the one or more memories to further implement a unit configured to transfer, to an operating system, the data to be transmitted to the cloud print service, which is converted by the conversion unit.

**18**. A method executed in an information processing apparatus comprising an application configured to extend a function of a driver supporting a cloud print service, comprising:

- in the application,
- acquiring capability information of a printer corresponding to the driver from the cloud print service if printing via the driver is performed;
- displaying a setting screen corresponding to the capability information based on the acquired capability information;
- acquiring intermediate data generated by software different from the application configured to extend the function of the driver supporting the cloud print service, the intermediate data having been generated based on setting information of the displayed setting screen corresponding to the capability information of the printer corresponding to the driver from the cloud print service; and
- converting the acquired intermediate data, generated based on the setting information of the displayed setting screen corresponding to the capability information of the printer corresponding to the driver from the cloud print service, into data to be transmitted to the cloud print service.

**19**. A non-transitory computer-readable storage medium storing an application configured to extend a function of a driver supporting a cloud print service, the application, when executed by a computer, being configured to cause the computer to:

- acquire capability information of a printer corresponding to the driver from the cloud print service if printing via the driver is performed;
- display a setting screen corresponding to the capability information based on the acquired capability information;
- acquire intermediate data generated by software different from the application configured to extend the function of the driver supporting the cloud print service, the intermediate data having been generated based on setting information of the displayed setting screen corresponding to the capability information of the printer corresponding to the driver from the cloud print service; and

convert the acquired intermediate data, generated based on the setting information of the displayed setting screen corresponding to the capability information of the printer corresponding to the driver from the cloud print service, into data to be transmitted to the cloud print service.

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