



Guideline of Camera & Imaging Products Association

*CIPA DCG-X006-Translation-2011*

**Implementation Guidelines for DPS over IP**

DRAFT

Prepared by  
Standardization Committee

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Camera & Imaging Products Association

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# Overview

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This document specifies implementation guidelines for using the DPS standard in LAN environments, through the use of CIPA DC-001 (Digital Photo Solutions for Imaging Devices) (hereinafter called “DPS standard”), typically called PictBridge, and CIPA DC-005 (“Picture Transfer Protocol” over TCP/IP networks (PTP-IP)) (hereinafter called “PTP-IP standard”), which are defined by CIPA.

Methods of verifying interconnectivity between DPS devices in wireless LAN environments and conformance specifications for use of logotypes will be separately defined.

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# 1. Background and Overview

## 1.1 Background

The DPS standard is independent of the physical I/F. However, the only physical I/F specified in the implementation guidelines is USB.

In 2005, CIPA established the PTP-IP standard for PTP (Picture Transfer Protocol) communication on TCP (Transfer Control Protocol), but did not specify implementation guidelines for DPS, assuming the PTP-IP standard, thereby causing a problem in interconnectivity.

## 1.2 Overview

The objective of the present guidelines is to compile mutually-respected conventions into guidelines, for various settings that have not yet been determined in LAN I/F connection environments and unclear technical items for realizing DPS services using the PTP-IP standard.

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## 2. Scope

The present guidelines define conventions for expansion to LAN connection environments, in addition to USB supported as the sole physical I/F of the DPS standard.

The present guidelines apply to image input devices such as DSC and image output devices such as printers, which are connected to each other in a LAN environment and have a direct print function.

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### 3. Definitions of Terms

#### 3.1 Verbal Forms of Terms Representing Specification

##### Level

Pursuant to ISO/IEC rules, terms in this document shall be construed as described below.  
(See Directives 2 Annex H “Verbal forms for the expression of provisions”.)

##### Requirements

Verbal forms	Equivalent expressions
shall	is mandatory
shall not	is not allowed

##### Recommendations

Verbal forms	Equivalent expressions
should	it is recommended that is recommended
should not	

##### Permissions

Verbal forms	Equivalent expressions
may	is optional
need not	is not required

##### Possibility and Capability

Verbal forms	Equivalent expressions
can	it is possible to
cannot	

---

## 3.2 Terms

<b>DSC</b>	Digital Still Camera
<b>PRT</b>	Printer
<b>AP</b>	Access Point
<b>Wi-Fi®</b>	Wi-Fi®
<b>WPA2™</b>	Wi-Fi Protected Access® 2
<b>WPS</b>	Wi-Fi Protected Setup™
<b>(TBD)</b>	
<b>PSK</b>	Pre Shared Key
<b>UPnP™</b>	Universal Plug and Play

---

## 4. Communication Protocol Architecture of DPS over IP

A Communication Protocol Architecture of LAN I/F-based DPS is described below in comparison with a USB I/F-based Communication Protocol Architecture.

### 4.1 Communication Protocol Architecture of USB I/F-Based DPS

USB I/F-based DPS is described in detail in the DPS standard in CIPA.

USB I/F is characterized by the adoption of SICD (Still Image Capture Device) as a USB device class for connecting PTP, an image transfer protocol.

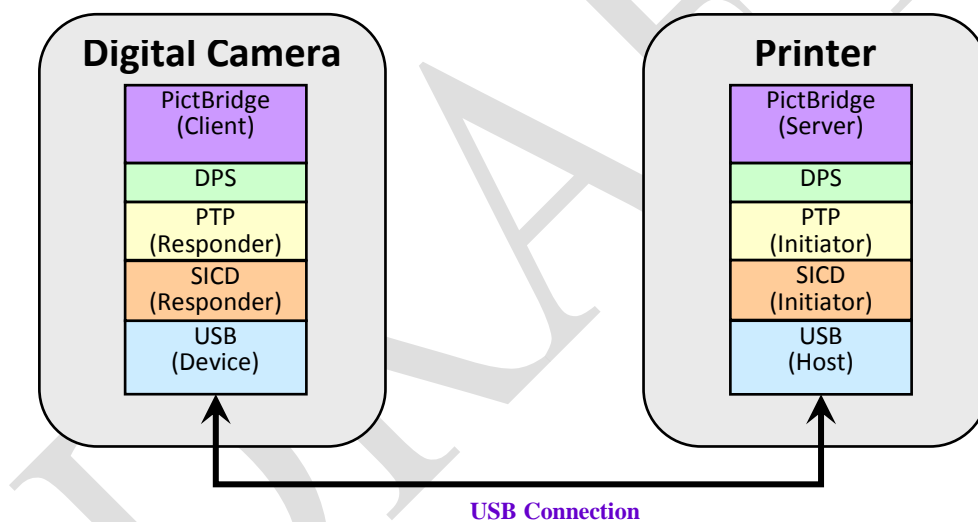


Figure 4-1

## 4.2 Communication Protocol Architecture of LAN I/F-Based DPS

Figure 4-2 is a Communication Protocol Architecture of LAN I/F-based DPS.

Wired LAN/wireless LAN shall be used as the physical I/F. The PTP-IP standard (CIPA DC-005-2005 “Picture Transfer Protocol over TCP/IP networks”) standardized by CIPA shall be adopted as the protocol for connecting the above TCP/IP layer and PTP, an image transfer protocol, to each other using a TCP session.

In order to select a device to be connected in a PTP session from among devices in the network, DPSPrinterDevice and DPSConnectionManagerService defined by CIPA on the basis of UPnP DA1.0 shall be adopted.

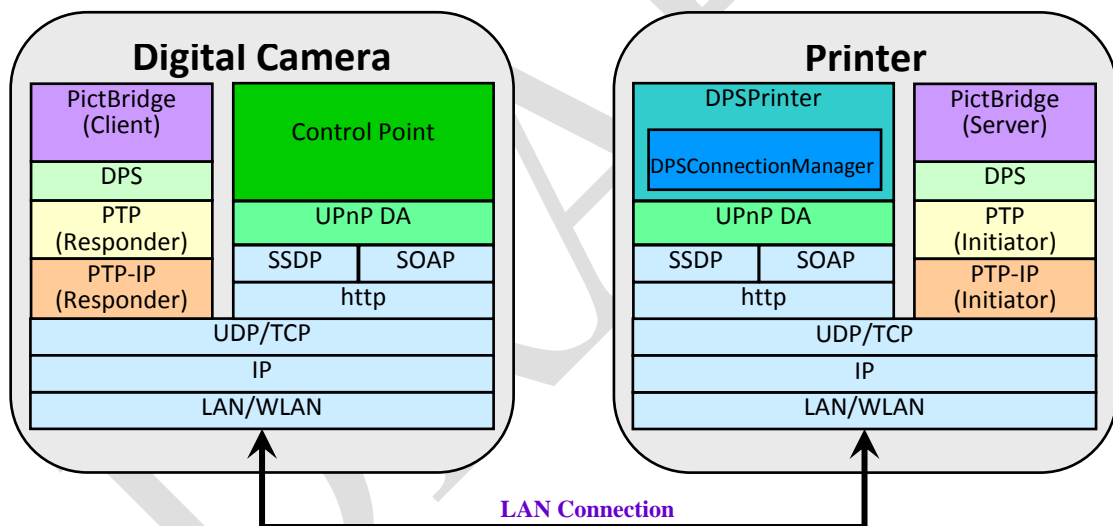


Figure 4-2

---

## 5. Connection Topology in LAN Environments

The LAN connection topology in DPS over IP is specified as follows.

### 5.1 Physical Connection Topology

Figure 5-1 shows an example of a physical connection topology in DPS over IP.

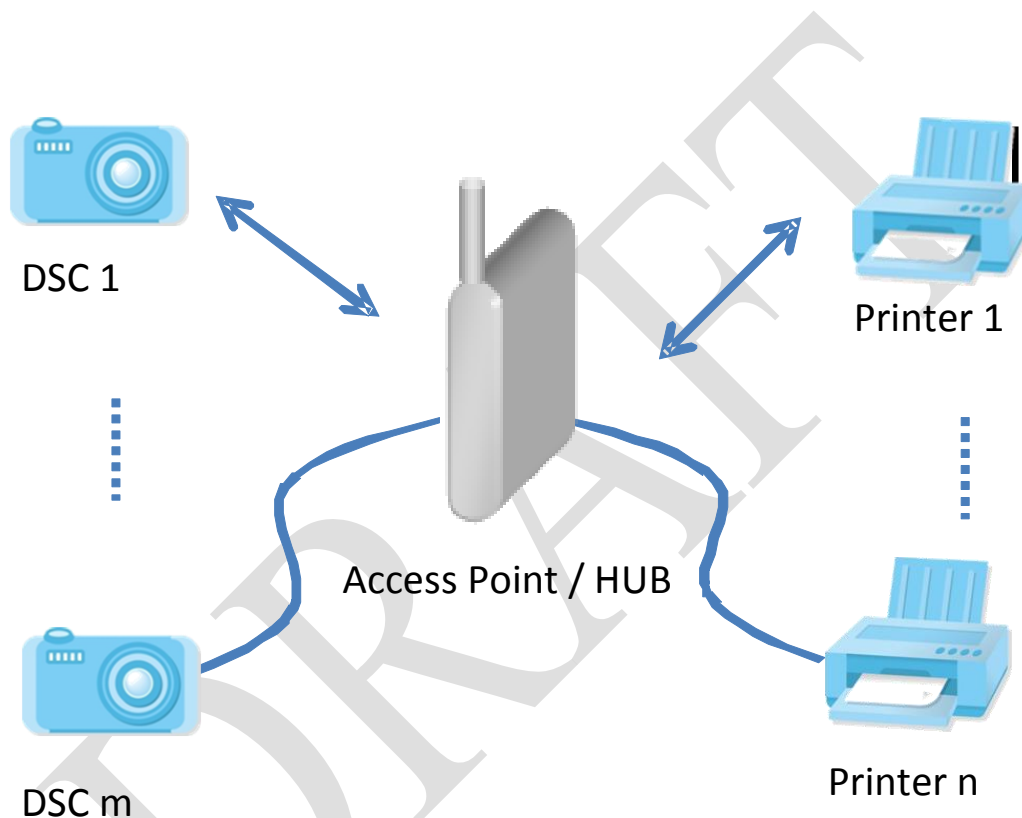


Figure 5-1

As shown in the example of Figure 5-1, in the case of using LAN I/F, it shall be assumed, in a physical connection topology, that DSCs and PRTs are connected to each other and even a Multi Point-Multi Point connection topology is configured.

Connection via 100BASE-TX of the IEEE802.3 standard shall be adopted as a physical I/F for using wired LAN I/F; another connection may be adopted. Connection via an infrastructure mode of any IEEE802.11b/g/n (2.4 GHz band) should be adopted as a physical I/F for using wireless LAN I/F; another connection may be adopted.

---

## 5.2 Logical Connection Topology

Figure 5-2 shows an example of a logical connection topology of DPS over IP.

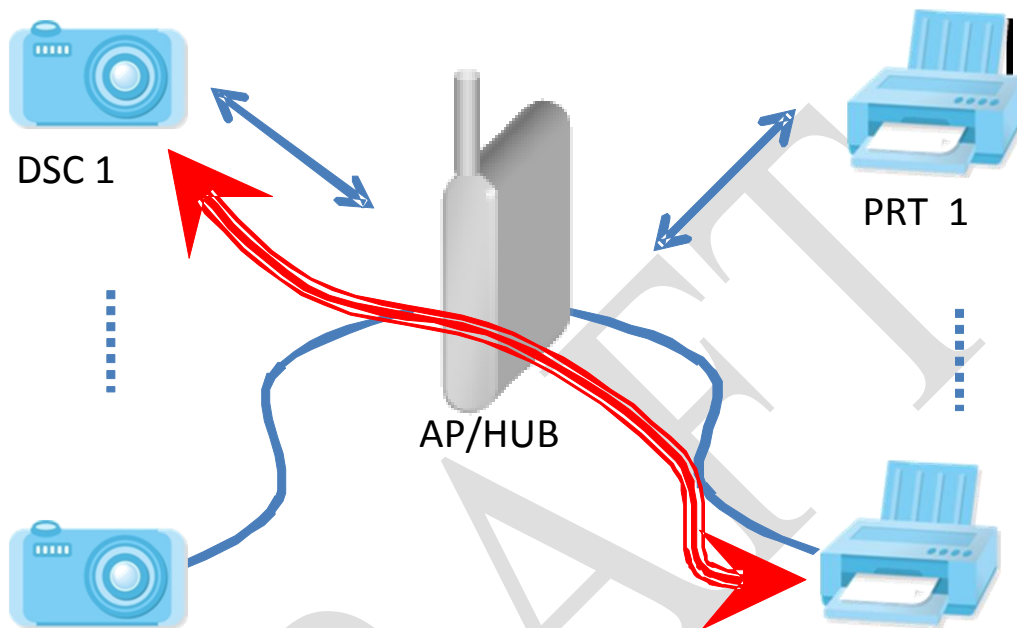


Figure 5-2

In order to implement DPS services between DSC1 and PRTn in a physical connection topology shown in the example of Figure 5-1, a Point-Point logical communication path as shown in Figure 5-2 shall be configured for DPS to establish a PTP-IP session.

The connection and termination of the PTP-IP session will be described in Section 10.

---

## 6. Setup of Wireless LAN

### 6.1 Setup Method

Setup Method on operation modes of wireless LAN (802.11 series) is specified as follows.

#### 6.1.1 Simple Setup in Infrastructure Mode

A simple connection scheme should comply with the WPS scheme implemented in many Wi-Fi-certified APs; a simple connection scheme other than WPS may be adopted.

In addition to the WPS-PIN scheme, which shall be employed when WPS is adopted, the WPS-PBC scheme should be adopted; another scheme may be adopted.

In the case of adopting WPS, the certification requirements of “Wi-Fi Protected Setup” specified by Wi-Fi Alliance® shall be met.

#### 6.1.2 Simple Setup in Ad Hoc Mode

(TBD)

#### 6.1.3 Simple Setup in Wi-Fi Direct™

In addition to the WPS-PIN scheme, which shall be adopted in WPS specifications, the WPS-PBC scheme should be adopted; another scheme may be adopted.

In the case of adopting WPS, the certification requirements of “Wi-Fi Protected Setup” specified by Wi-Fi Alliance® shall be met.

#### 6.1.4 Manual Input Settings in Infrastructure Mode

In order to allow connection to devices not complying with the simple setting scheme, a function for assigning setting information of wireless LAN by manual input should be provided.

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## 7. Secure Connection

### 7.1 Wireless LAN Security

In a wireless LAN communication path using wireless communication media, compliance with the security specifications specified in Wi-Fi® prevents leakage of communication details to third parties who intercept communication.

#### 7.1.1 Secure Connection of Infrastructure Mode

It is strongly recommended that WPA2™ be adopted for communication security of the infrastructure mode; a scheme other than WPA2™ may be adopted.

In the case of adopting WPA2™, the certification requirements of “Wi-Fi 802.11/ WPA2™ /WPA™ “ specified by Wi-Fi Alliance® shall be met.

#### 7.1.2 Secure Connection of Ad Hoc Mode

(TBD)

#### 7.1.3 Secure Connection of Wi-Fi Direct™

It is strongly recommended that WPA2™ be adopted; a scheme other than WPA2™ may be adopted.

In the case of adopting WPA2™, the certification requirements of “Wi-Fi 802.11/ WPA2™ /WPA™ “ specified by Wi-Fi Alliance® shall be met.

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## 8. IP Addressing

### 8.1 IP Address Assignment

After connection of the physical layer at the LAN level is completed between devices, IP address assignment for providing IP addresses shall be performed as described below.

#### 8.1.1 Address Assignment in Wired LAN and Wireless LAN (Infrastructure Mode)

A DHCP client and Auto-IP shall be implemented. A setting means utilizing device UI input should be adopted.

#### 8.1.2 Address Assignment in Ad Hoc Mode

(TBD)

#### 8.1.3 Address Assignment in Wi-Fi Direct™ Connection

Devices complying with “Wi-Fi Direct” shall implement both a DHCP server and a DHCP client.

### 8.2 IP Address Space

In the present guidelines, IPv4, which is widely used in private networks such as home networks, shall be complied with.

IPv6 used in wide-area IP networks may be complied with.

---

## 9. Security of IP Session

### 9.1 Assurance of IP Session

The present guidelines do not particularly specify a method of assuring security on the IP session. Methods such as IPSec may be utilized, and security on the IP session may be assured, as necessary.

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## 10. PTP-IP Session

Connection and termination of a PTP-IP session are specified in the following sections.

### 10.1 Connection Timing of PTP-IP Logical Communication

#### Path

After completion of the LAN communication path connection (MAC Connect) and IP addressing, prior to setup on a logical communication path for a PTP-IP session specified in Section 5.2, a process of searching for a printer (PTP-IP Initiator) shall be executed. After a trigger from a user's operation input device establishes P2P connection, connection via a PTP-IP logic communication path shall be made with DSC that has been fixedly connected, on the initiative of the printer (PTP-IP Initiator).

On searching for the PTP-IP Initiator and a method of establishing P2P connection, UPnP DA1.0, "DPSPrinterDevice" and "DPSConnectionManagerService" shall be referred to.

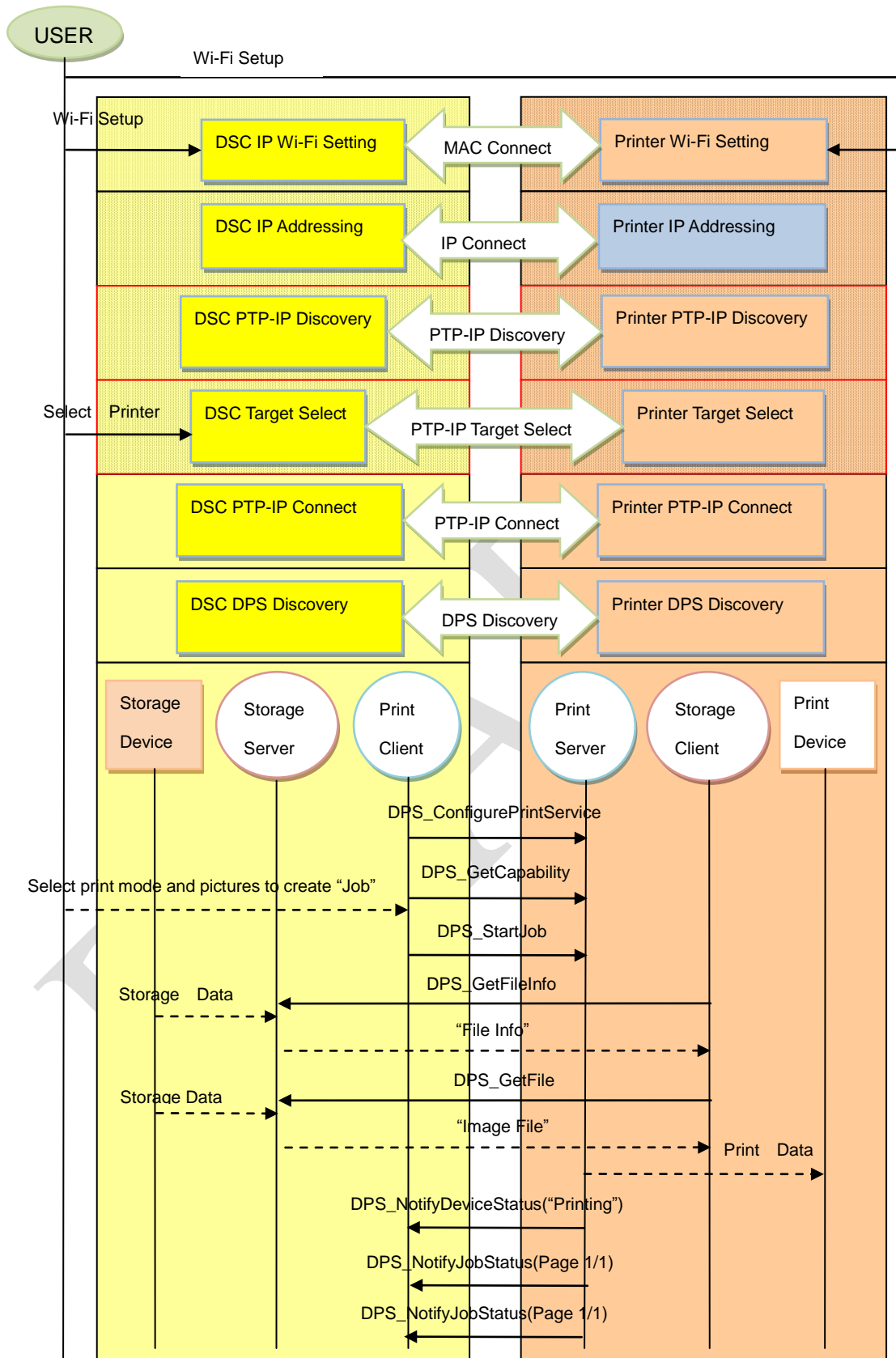


Figure 10-1 DPS over IP Job Flow (Case of User's Operation Input on DSC Side) Example

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## 10.2 Termination Timing of PTP-IP Logical

### Communication Path

Pursuant to the specifications of Section 2.2.3.3 in the PTP-IP standard (CIPA DC-005-2005 “Picture Transfer Protocol over TCP/IP networks”), in either of the two cases:

1) where Initiator determines that maintenance of the logical communication path is unnecessary, or

2) where Initiator or Responder detects a communication error and determines that the logical communication path is difficult to be maintained,

then Teardown of PTP-IP (closing the TCP Port) shall be made.

Note that “DPSPrinter Device” on the Initiator side should transmit a message for leaving the network (ssdp:byebye), prior to Teardown.

When PRT (Initiator) determines that maintenance of the logical communication path is unnecessary, the necessity of maintaining the PTP-IP communication path should be determined in consideration of the time required for the user’s continuous printing operation and the like.

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## 11. References

In the case of citing and referring to documents in the present document, the following abbreviations are used to indicate cited parties.

DPS	Digital Photo Solutions for Imaging Devices CIPA DC-001-2003 Rev2.0 <a href="http://www.cipa.jp/">http://www.cipa.jp/</a>
PTP-IP	“Picture Transfer Protocol” over TCP/IP networks CIPA DC-005-2005 <a href="http://www.cipa.jp/">http://www.cipa.jp/</a>
WPA2™	The State of Wi-Fi® Security: Wi-Fi CERTIFIED™ WPA2™ Delivers Advanced Security to Homes, Enterprises and Mobile Devices (2009) <a href="http://www.wi-fi.org/">http://www.wi-fi.org/</a>
WPS	Wi-Fi Protected Setup™ : Easing the User Experience for Home and Small Office Wi-Fi® Networks (2010) Wi-Fi Simple Configuration Specification v2.0.0 <a href="http://www.wi-fi.org/">http://www.wi-fi.org/</a>
Wi-Fi Direct™	Wi-Fi CERTIFIED Wi-Fi Direct™: Personal, portable Wi-Fi® to connect devices anywhere, any time (2010) Wi-Fi CERTIFIED Wi-Fi Direct™: Personal, portable Wi-Fi® technology (2010) Wi-Fi Peer-to-Peer (P2P) Specification v1.1 <a href="http://www.wi-fi.org/">http://www.wi-fi.org/</a>
(TBD)	(TBD)
Directives 2	ISO/IEC Directives, Part 2 “Rules for the structure and drafting of International Standards” <a href="http://www.iso.org/">http://www.iso.org/</a>
UPnP DA1.0	UPnP Device Architecture (UDA), version 1.0 <a href="http://upnp.org/specs/arch/UPnP-arch-DeviceArchitecture-v1.0.pdf">http://upnp.org/specs/arch/UPnP-arch-DeviceArchitecture-v1.0.pdf</a>
DPSPrinter	CIPA Digital Photo Solutions for Imaging Devices DPSPrinter:1 Device Template Version 1.01
DPSConnection Manager	CIPA Digital Photo Solutions for Imaging Devices DPSConnectionManager:1 Service Template Version 1.01

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## Normative Annex

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**CIPA**  
**Digital Photo Solutions for**  
**Imaging Devices**

**DPSPrinter:1**  
**Device Template Version 1.01**

Revision 1.0

October 19, 2011

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# 1. Overview and Scope

## 1.1 Introduction

This device template is compliant with the UPnP™ Architecture, Version *1.0* as a vendor extended device. It defines a DPSPrinter device over IP network.

CIPA DC-001-2003 defines the “Digital Photo Solutions for Imaging Devices (DPS)” specifications, which enable direct printing between an image source device such as a DSC, and an image output device such as a printer. The DPS architecture is designed to operate at the application layer and to be independent of the details of the underlying data transport. The first-generation solution was deployed over USB. This template defines the next-generation solution that will be deployed over IP network, utilizing the PTP-IP that enables a PTP connection over IP network. See [\[DPS\]](#), [\[PTP\]](#) and [\[PTP-IP\]](#) for more information.

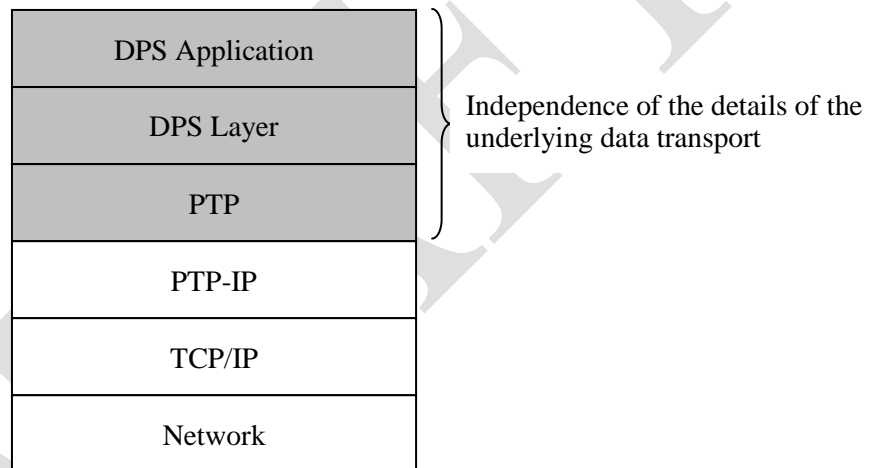


Figure 1-1: DPS over IP network protocol stack

**DPSPrinter**:1 provides the following functionality:

- DPS Connection Manager (**DPSConnectionManager**).

This template does not address:

- DPS Discovery
- DPS Print Service
- DPS Storage Service

## 1.2 Conventions

The keywords “MUST,” “MUST NOT,” “REQUIRED,” “SHALL,” “SHALL NOT,” “SHOULD,” “SHOULD NOT,” “RECOMMENDED,” “MAY,” and “OPTIONAL” in this document are to be interpreted as described in [\[RFC2119\]](#).

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## 1.3 References

[DEVICE] – UPnP Device Architecture (UDA), version 1.0

Available at: <http://upnp.org/specs/arch/UPnP-arch-DeviceArchitecture-v1.0.pdf>

[DPS] – CIPA DC-001-2003 Rev2.0, Digital Photo Solutions for Imaging Devices

Available at: [http://www.cipa.jp/pictbridge/index\\_e.html](http://www.cipa.jp/pictbridge/index_e.html)

[PTP] – “Photography – Electronic still picture imaging – Picture transfer protocol (PTP) for digital still photography devices,” ISO 15740:2008

Available at: <http://www.iso.org/>

[PTP-IP] – CIPA DC-005-2005, “Picture Transfer Protocol” over TCP/IP networks (PTP-IP)

Available at: <http://www.cipa.jp>

[RFC2119] – IETF RFC2119 - Key words for use in RFCs to Indicate Requirement Levels, March 1997

Available at: <http://www.ietf.org/rfc/rfc2119.txt>

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## 2. Device Definitions

### 2.1 Device Type

The following device type identifies a device that is compliant with this template:

urn:schemas-cipa-jp:device:*DPSPrinter*:1

### 2.2 Device Model

*DPSPrinter* products MUST implement minimum version numbers of all REQUIRED services specified in the table below.

**Table 2-1: Device Requirements**

DeviceType	Root	R/O <sup>1</sup>	ServiceType	R/O <sup>1</sup>	Service ID <sup>2</sup>
DPSPrinter:1	Root	R	DPSConnectionManager:1	R	DPSConnectionManager

<sup>1</sup> R = Required, O = Optional, X = Non-standard

<sup>2</sup> Prefixed by urn:[cipa-jp:serviceId](#):

### 2.3 Theory of Operation

#### 2.3.1 Device Discovery

A control point (DPS Print Client, such as a DSC) can discover *DPSPrinter* devices by the Simple Service Discovery (SSDP) as defined in [\[DEVICE\]](#).

#### 2.3.2 PTP Connection Establishment

After a *DPSPrinter* device is discovered, the control point issues the DPSConnectionManager: ConnectionRequest() action to establish a PTP connection, and then the *DPSPrinter* initiates the PTP connection by using PTP-IP. After the PTP connection and DPS discovery succeed, the control point can utilize the DPS Print Service, and the *DPSPrinter* device can utilize the DPS Storage Service. The DPS Print Service and the DPS Storage Service are based on [\[DPS\]](#), not UPnP architecture.

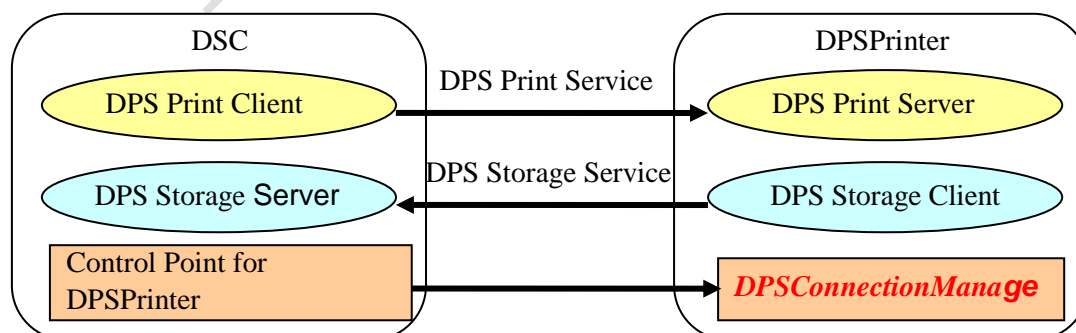


Figure 2-1 Functional components of DPS devices

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### 3. XML Device Description

```
<?xml version="1.0"?>
<root xmlns="urn:schemas-upnp-org:device-1-0">
  <specVersion>
    <major>1</major>
    <minor>0</minor>
  </specVersion>
  <URLBase>base URL for all relative URLs</URLBase>
  <device>
    <deviceType>urn:schemas-cipa-jp:device:DPSPrinter:1</deviceType>
    <friendlyName>short user-friendly title</friendlyName>
    <manufacturer>manufacturer name</manufacturer>
    <manufacturerURL>URL to manufacturer site</manufacturerURL>
    <modelDescription>long user-friendly title</modelDescription>
    <modelName>model name</modelName>
    <modelName>model name</modelName>
    <modelNumber>model number</modelNumber>
    <modelURL>URL to model site</modelURL>
    <serialNumber>manufacturer's serial number</serialNumber>
    <UDN>uuid:UUID</UDN>
    <UPC>Universal Product Code</UPC>
    <iconList>
      <icon>
        <mimetype>image/format</mimetype>
        <width>horizontal pixels</width>
        <height>vertical pixels</height>
        <depth>color depth</depth>
        <url>URL to icon</url>
      </icon>
      XML to declare other icons, if any, go here
    </iconList>
    <serviceList>
      <service>
        <serviceType>
          urn:schemas-cipa-jp:service:DPSConnectionManager:1
        </serviceType>
        <serviceId>urn:cipa-jp:serviceId:DPSConnectionManager</serviceId>
        <SCPDURL>URL to service description</SCPDURL>
        <controlURL>URL for control</controlURL>
        <eventSubURL></eventSubURL>
      </service>
      Declarations for other services added by UPnP vendor (if any) go here
    </serviceList>
    <deviceList>
      Description of embedded devices added by UPnP vendor (if any) go here
    </deviceList>
    <presentationURL>URL for presentation</presentationURL>
  </device>
</root>
```

---

## 4. Test

There are no semantics tests defined for this device.

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**CIPA**  
**Digital Photo Solutions for**  
**Imaging Devices**

**DPSConnectionManager:1**  
**Service Template Version 1.01**

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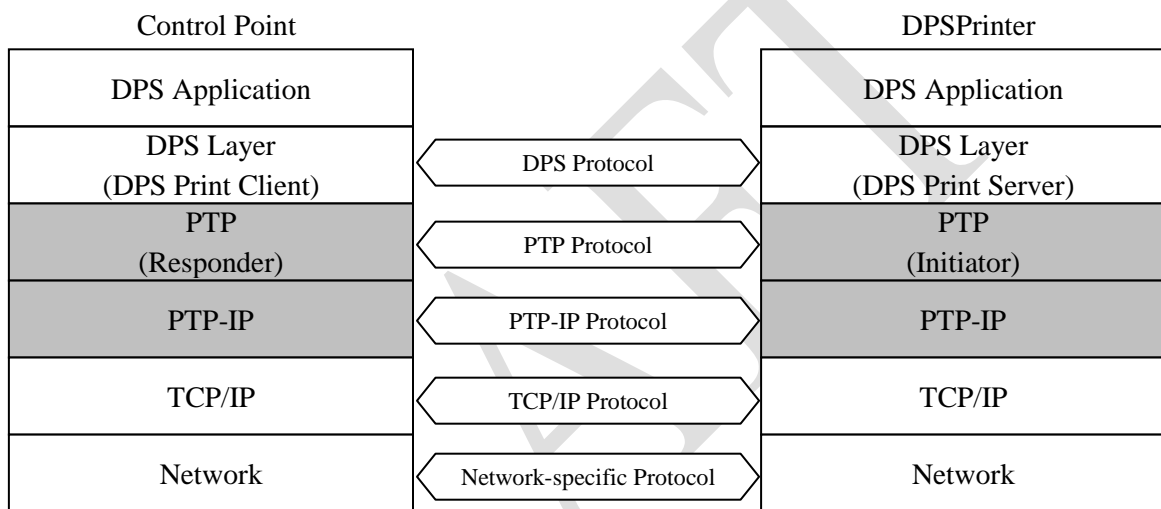
---

# 1. Overview and Scope

This service definition is compliant with the UPnP™ Device Architecture, Version *1.0* as a vendor extended service. It defines a service type referred to herein as *DPSConnectionManager* service.

## 1.1 Introduction

This service enables the PTP connection between a *DPSPrinter* device as a PTP Initiator and a control point as a PTP Responder. The PTP connection is established by using PTP-IP. See [\[PTP\]](#) and [\[PTP-IP\]](#) for more information.



**Figure 1-1 DPS Communication Stack**

The *DPSConnectionManager* service provides control points with the following functionality:

- Initiating the PTP connection

This service does not provide the following functionality:

- PTP connection establishment process
- PTP connection

## 1.2 Conventions

The keywords “MUST,” “MUST NOT,” “REQUIRED,” “SHALL,” “SHALL NOT,” “SHOULD,” “SHOULD NOT,” “RECOMMENDED,” “MAY,” and “OPTIONAL” in this document are to be interpreted as described in [\[RFC2119\]](#).

**Notice:** “\*\*\*\*\*” means hidden value.

---

## 1.3 References

[DEVICE] – UPnP Device Architecture (UDA), version 1.0

Available at: <http://upnp.org/specs/arch/UPnP-arch-DeviceArchitecture-v1.0.pdf>

[DPS] – CIPA DC-001-2003 Rev2.0, Digital Photo Solutions for Imaging Devices

Available at: [http://www.cipa.jp/pictbridge/index\\_e.html](http://www.cipa.jp/pictbridge/index_e.html)

[PTP] – “Photography – Electronic still picture imaging – Picture transfer protocol (PTP) for digital still photography devices”, ISO 15740:2008

Available at: <http://www.iso.org/>

[PTP-IP] – CIPA DC-005-2005, “Picture Transfer Protocol” over TCP/IP networks (PTP-IP)

Available at: <http://www.cipa.jp>

[RFC3986] – IETF RFC3986 - Uniform Resource Identifier (URI): Generic Syntax

Available at: <http://www.ietf.org/rfc/rfc3986.txt>

[RFC2119] – IETF RFC2119 - Key words for use in RFCs to Indicate Requirement Levels, March 1997

Available at: <http://www.ietf.org/rfc/rfc2119.txt>

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## 2. Service Modeling Definitions

### 2.1 Service Type

The following service type identifies a service that is compliant with this template:

`urn:schemas-cipa-jp:service:DPSCConnectionManager:1`

### 2.2 State Variables

The state variables of this service are shown below.

**Table 2-1 State Variables**

Variable Name	R/O <sup>1</sup>	Data Type	Allowed Value	Default Value
PTPResponderIPAddress	R	string	IP Address and port number, PTPResponderIPAddress = IPv4address [“:” port], IPv4address and port as defined in <a href="#">[RFC3986]</a>	Not specified
RequestResult	R	string	*****, *****, *****	Not specified
<i>Vendor-defined</i>	<i>X</i>	<i>TBD</i>	<i>TBD</i>	<i>TBD</i>

<sup>1</sup> R = Required, O = Optional, X = Non-standard

#### 2.2.1 PTPResponderIPAddress

This variable indicates the IP address and port number of a device that is the PTP Responder. If the port (including “:”) is omitted, the port number is 15740. The DPSPrinter attempts to establish the PTP connection with the device. The device **MUST** be the same as the control point that issues a connection request.

#### 2.2.2 RequestResult

This variable represents the result of a connection request by a control point.

**Table 2-2** allowedValueList for RequestResult

Value	R/O	Description
*****	R	Connection request is accepted.
*****	R	Connection request is rejected.
*****	O	Connection request failed because the DPSPrinter is busy.
<i>Vendor-defined</i>	<i>X</i>	<i>TBD</i>

---

## 2.3 Eventing and Moderation

**Table 2-3 Event Moderation**

Variable Name	Evented	Moderated Event	Max Event Rate	Logical Combination	Min Delta per Event
PTPResponderIPAddress	No	n/a	n/a		n/a
RequestResult	No	n/a	n/a		n/a
<i>Vendor-defined</i>	<i>TBD</i>	<i>TBD</i>	<i>TBD</i>	<i>TBD</i>	<i>TBD</i>

## 2.4 Actions

The actions of this service are shown below:

**Table 2-4 Actions**

Name	R/O
ConnectionRequest	R
<i>Vendor-defined</i>	<i>X</i>

### 2.4.1 ConnectionRequest

This action is used to request a PTP connection. If the request is accepted, the DPSPrinter initiates the PTP connection with the device that issued this action by using PTP-IP as defined in [\[PTP-IP\]](#).

#### 2.4.1.1 Arguments

**Table 2-5 Arguments of ConnectionRequest**

Argument	Direction	Related State Variable
PTPResponderIPAddress	IN	PTPResponderIPAddress
RequestResult	OUT	RequestResult

#### 2.4.1.2 Errors

**Table 2-6 Errors of ConnectionRequest**

Error Code	Error Description	Description
402	Invalid Args	See UPnP Device Architecture section on Control.
501	Action Failed	See UPnP Device Architecture section on Control.

---

## 2.5 Theory of Operation

The *DPSPrinter* device is a PTP Initiator, and shall initiate a PTP connection. However, since the *DPSPrinter* device is a service provider, the *DPSPrinter* device can not initiate the PTP connection without a trigger by a control point which is a connection request. To establish the PTP connection, the control point issues the connection request, utilizing a `ConnectionRequest()` action, to the *DPSPrinter* device, and then the *DPSPrinter* device initiates the PTP connection. After the PTP connection and DPS discovery succeed, the DPS services are available. See [\[DPS\]](#) for details regarding the DPS discovery and DPS services.

### 2.5.1 Connection Request

When the control point discovers the *DPSConnectionManager* service in the *DPSPrinter* device, the control point can issue a `ConnectionRequest()` action to establish the PTP connection. If `RequestResult` of the `ConnectionRequest()` response is “\*\*\*\*\*”, the *DPSPrinter* device initiates the PTP connection. If the `RequestResult` is not “\*\*\*\*\*”, the request failed for some reason (e.g. the request is rejected, the device is busy).

### 2.5.2 Initiating the PTP connection

When the connection request is accepted, the *DPSPrinter* device attempts to establish the PTP connection by utilizing the PTP-IP. The PTP connection establishment process is out of scope of this template. See [\[PTP\]](#) and [\[PTP-IP\]](#) for more information.

---

### 3. XML Service Description

```
<?xml version="1.0"?>
<scpd xmlns="urn:schemas-upnp-org:service-1-0">
  <specVersion>
    <major>1</major>
    <minor>0</minor>
  </specVersion>
  <actionList>
    <action>
      <name>ConnectionRequest</name>
      <argumentList>
        <argument>
          <name>PTPResponderIPAddress</name>
          <direction>in</direction>
          <relatedStateVariable>PTPResponderIPAddress</relatedStateVariable>
        </argument>
        <argument>
          <name>RequestResult</name>
          <direction>out</direction>
          <relatedStateVariable>RequestResult</relatedStateVariable>
        </argument>
      </argumentList>
    </action>
  </actionList>
  <serviceStateTable>
    <stateVariable sendEvents="no">
      <name>PTPResponderIPAddress</name>
      <dataType>string</dataType>
    </stateVariable>
    <stateVariable sendEvents="no">
      <name>RequestResult</name>
      <dataType>string</dataType>
      <allowedValueList>
        <allowedValue>*****</allowedValue>
        <allowedValue>*****</allowedValue>
        <allowedValue>*****</allowedValue>
      </allowedValueList>
    </stateVariable>
  </serviceStateTable>
</scpd>
```

---

## 4. Test

There are no semantics tests defined for this device.

DRAFT

# Appendix A. PTP Connection Establishment Sequence (Informative)

## A.1. Discovery: Advertisement

A PTP connection establishment sequence utilizing Discovery: Advertisement as defined in [\[DEVICE\]](#) is shown below.

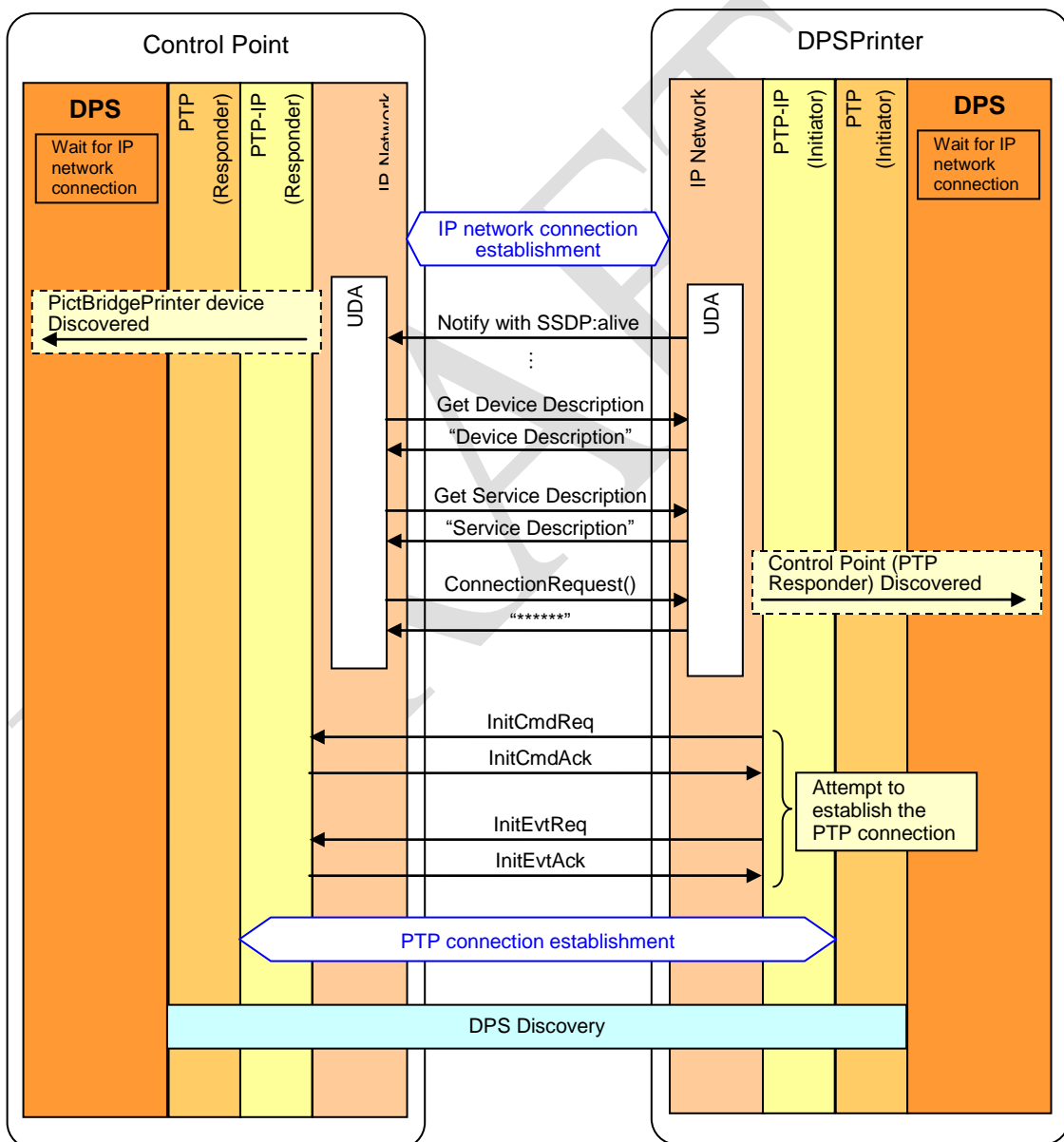


Figure A.1 PTP connection establishment sequence - Advertisement

## A.2.Discovery: Search

A PTP connection establishment sequence utilizing Discovery: Search as defined in [\[DEVICE\]](#) is shown below.

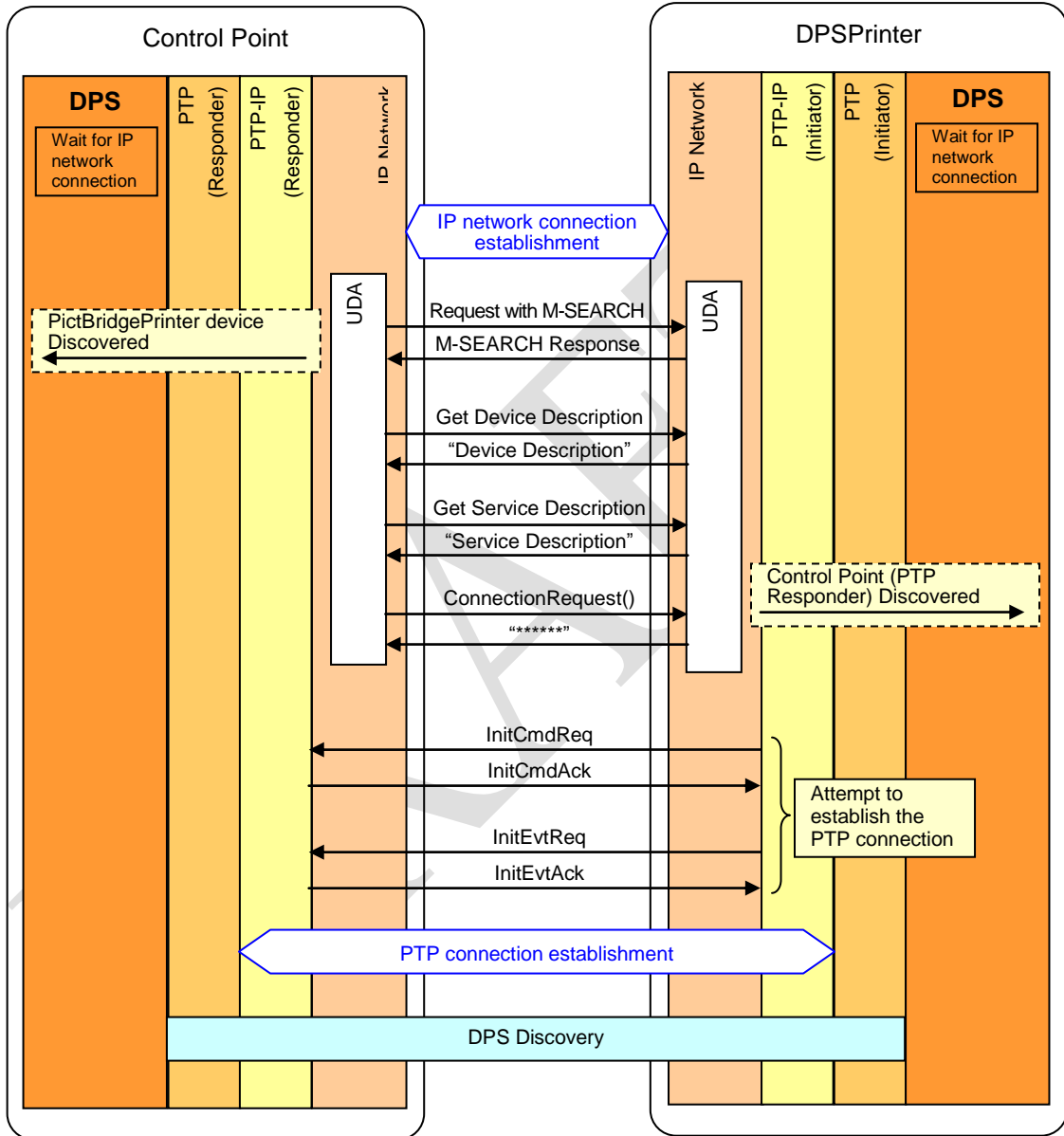


Figure A.2 PTP connection establishment sequence - Search

---

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JCII BLDG., 25, Ichiban-cho, Chiyoda-ku, Tokyo, 102-0082 Japan  
TEL +81-3-5276-3891 FAX +81-3-5276-3893

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