

UPnP Printer:2 Device Template Version 1.0

Proposal

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Table of Contents

1. Overview and Scope	3
2 Device Definitions	5
2.1 Device Type	5
2.2 Device Model.....	5
2.2.1 Description of Device Requirements	5
2.2.1 Relationships Between Services.....	5
2.3 Theory of Operations.....	5
2.3.1 Discovery	5
2.3.2 Job Submittal and Control.....	6
3 XML Device Description.....	6

1. Overview and Scope

This device template is compliant with the UPnP Device Architecture, Version 1.0. The goal of Printer:2 is to modify the Printer Device as minimally as possible to support the discovery of IPP Everywhere Printers. In this case UPnP is being used as discovery service for an IPP Everywhere device and provides basic information about the capabilities of a Print class device without having to query the devices IPP Properties. After discovery, all additional communication with the device is done via IPP.

Printer:2 provides the following functionality:

- Printing

This device template also addresses additional functionality not originally covered by Printer:1, but covered by IPP Everywhere, including:

- Scanning
- Faxing
- Additional multi-function device features

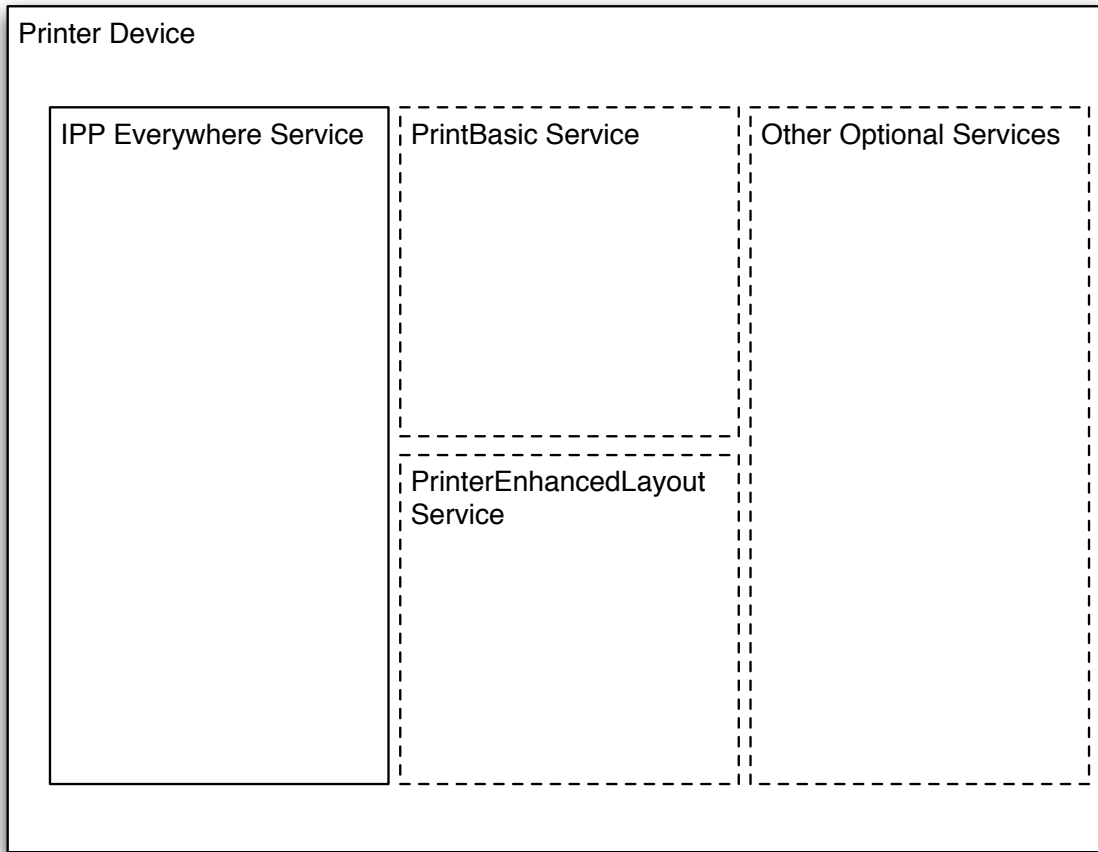


Figure 1: Printer:2 Functional Diagram

The above model illustrates a Printer device with the required service being the IPP Everywhere Service. The Printer Device includes the location of the IPP Everywhere endpoints for communicating with the device. The Printer:2 advertisement includes the equivalent of the Bonjour txt records for the Printer discovered with Printer:2.

The IPP Everywhere Service is mandatory in a Printer:2 Device. Additional services may be present. One of these optional services is PrintBasic. The PrintBasic Service includes print-related attributes along with all job-related attributes (e.g., JobName, DocumentFormat, Copies, etc). Another of these optional services is the PrinterEnhancedLayout Service. The PrinterEnhancedLayout Service extends the PrintBasic service with additional operations and semantics. The PrinterEnhancedLayout Service makes use of the Printer and Job attributes from the PrintBasic Service.

Note that PrintBasic and PrinterEnhancedLayout are both provided only for legacy device support and as such are OPTIONAL.

2 Device Definitions

2.1 Device Type

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

```
urn:schemas-upnp-org:device:printer:2
```

2.2 Device Model

Products that expose devices of the type `printer:2` must implement minimum version numbers of all required embedded devices and services specified in the table below.

Device Type	Root	Req or Opt ¹	Service Type	Req or Opt ¹	Service ID ²
Printer:2	Root	R	PrintBasic:1	O	1
			PrintEnhancedLayout:1	O	2
			IPPEverywhere:1	R	3

Table 1: Device Requirements for `urn:schemas-upnp-org:printer:2`

¹ R = Required, O = Optional, X = Non-standard.

² Prefixed by `urn:upnp-org:serviceId:`

2.2.1 Description of Device Requirements

The IPPEverywhere Service is a required service for a Printer:2 Device.

2.2.1 Relationships Between Services

The Printer Device only mandates one service, the IPPEverywhere Service. When PrintBasic or PrintEnhancedLayout are implemented, they are independent of IPPEverywhere, although PrintEnhancedLayout has a strong tie to PrintBasic. Again, these optional services are only present for backward compatibility

2.3 Theory of Operations

2.3.1 Discovery

When a device is added to the network, the UPnP discovery protocol allows that device to advertise its services to user control points on the network. The UPnP discovery protocol is based on SSDP. The Printer device must announce itself as:

- 1) a root device

- 2) a device UUID for its device type
- 3) a device type

2.3.2 Job Submittal and Control

Job Submittal and Control are handled through IPP Everywhere. See the Printer Working Group's documentation on the IPP Everywhere Specification. For PrintBasic and PrintEnhancedLayout, refer to their respective definition documents, as well as the Printer:1 document.

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-upnp-org:device:Printer:2</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>
  <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>
```

The PrintBasic service is an optional service.

```
<service>
  <serviceType>urn:schemas-upnp-org:service:PrintBasic:1</serviceType>
  <serviceId>urn:upnp-org:serviceId:1</serviceId>
  <SCPDURL>URL to service description</SCPDURL>
  <controlURL>URL for control</controlURL>
  <eventSubURL>URL for eventing</eventSubURL>
</service>
```

The PrintEnhancedLayout service is an optional service.

```
<service>
  <serviceType>urn:schemas-upnp.org:service:PrintEnhancedLayout:1
  </serviceType>
  <serviceId>urn:upnp-org:serviceId:2</serviceId>
  <SCPDURL>URL to service description</SCPDURL>
  <controlURL>URL for control</controlURL>
```

```
<eventSubURL>URL for eventing</eventSubURL>
</service>
```

The IPP Everywhere service is an optional service.

```
<service>
  <serviceType>urn:schemas-pwg.org:service:IPPEverywhere:1
    </serviceType>
  <serviceId>urn:upnp-org:serviceId:3</serviceId>
  <adminurl>Specifies the configuration URL for the printer.</adminurl>
  <note>The value is a user readable location of the printer.</note>
  <air>Type of authentication required for the services.</air>
  <tls>Version of TLS supported.</tls>
  <rp>This key is used to specify the print queue name.</rp>
  <pdlp>Comma-separated list of MIME types supported by printing.</pdlp>
  <Bind>Set value to "T" if the printer is capable of binding its output,
    "F" if its not.</Bind>
  <Collate>Set value to "T" if the printer is capable of generating
    collated copies, "F" if its not.</Collate>
  <Color>Set value to "T" if the printer is capable of generating color
    output, "F" if its not.</Color>
  <Copies>Set value to "T" if the printer is capable of generating fast
    copies, "F" if its not.</Copies>
  <Duplex>Set value to "T" if the printer is capable of generating two
    sided output, "F" if its not.</Duplex>
  <PaperCustom>Set value to "T" if the printer can handle custom paper
    sizes, "F" if its not.</PaperCustom>
  <PaperMax>"less-than-legal-A4", "legal-A4", "isoC-A2", "greater-that-
    isoC-A2" </PaperMax>
  <Punch>Set value to the number of holes of the hole puncher supported by
    the printer.</Punch>
  <Sort>Set value to "T" if the printer is capable of sort- ing its output,
    "F" if its not.</Sort>
  <Staple>Set value to "T" if the printer is capable of sta- pling output.,
    "F" if its not.</Sort>

  <rs>This key is used to specify the scan queue name.</rs>
  <pdl>Comma-separated list of MIME types supported by scanning.</pdl>
  <ADF>"T" if the Scanner has an Automatic Document Feeder, "F" if it
    doesn't.</ADF>
  <Button>Set value to "T" if the scanner is capable of using the scan
    button to initiate a scan, "F" if it isn't.</Button>
  <Camera>"T" if the Scanner has a non-traditional scan bed (such as a
    stage), "F" if it doesn't.</Camera>
  <Color>"T" if the Scanner supports color scanning, "F" if it
    doesn't.</Color>
  <Duplex>"T" if the Scanner has a duplex capable Automatic Document Feeder,
    "F" if it doesn't.</Duplex>
  <Glass>"T" if the Scanner has a traditional scan bed, "F" if it
    doesn't.</Glass>
  <Monochrome>"T" if the Scanner supports monochrome scanning, "F" if it
    doesn't.</Monochrome>
  <OCR>"T" if the Scanner is capable of performing OCR on the scan, "F" if
    it isn't.</OCR>
  <TMA>"T" if the Scanner has a Transparency Media Adaptor (an adaptor for
    scanning media such as slides and negatives), "F" if it doesn't.</TMA>

  <rf>This key is used to specify the fax queue name.</rf>
  <pdlf>Comma-separated list of MIME types supported by faxing.</pdlf>
```

Fax capabilities will be defined by the PWG as part of the IPP Everywhere project in Phase 2. When defined they need to be added here.

```
</service>
```

Declarations for other services defined by a UPnP Forum working committee (if any) go here.

```

    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 Bonjour to UPnP Mapping

The following tables maps Bonjour Printing fields to UPnP Printer:2 fields. If the Notes are blank, the field values should be identical between protocols.

Bonjour Key	UPnP Key	Notes
txtvers	specVersion	Not a direct mapping
rp, rs, rf	rp, rs, rf	Similar to USB, UPnP allows only one value for each key.
note	note	
qtotal	N/A	UPnP only allows one queue per resource type per device.
priority	N/A	Since there is only one queue per resource type there is no need for priority.
ty	modelDescription	
product	N/A	IPP Everywhere is “driverless” so there is no need for PPD file driver matching.
pdl	pdlp, pdls, pdlf	Since there is only one discovery needed, all three PDL’s can be called out in a single discovery.
adminurl	adminurl	
usb_MFG	manufacturer	
usb_MDL	modelName	
usb_CMD	N/A	Can be determined by the Raster formats supported in the pdlp key.
air	air	
TLS	tls	
UUID	UDN	For UPnP UDN is of the format UUID:<UUID>, where in Bonjour UUID is the key, and the value is <UUID>. The values in <UUID> should be identical.
Transparent	N/A	Printer Protocol TXT Record Keys not present.
Binary	N/A	Printer Protocol TXT Record Keys not present.
TBCP	N/A	Printer Protocol TXT Record Keys not present.
Bind	Bind	Value of “U” not supported for UPnP. If value is

		unknown, key should not be present.
Collate	Collate	Value of "U" not supported for UPnP. If value is unknown, key should not be present.
Color	Color	Value of "U" not supported for UPnP. If value is unknown, key should not be present.
Copies	Copies	Value of "U" not supported for UPnP. If value is unknown, key should not be present.
Duplex	Duplex	Value of "U" not supported for UPnP. If value is unknown, key should not be present.
PaperCustom	PaperCustom	Value of "U" not supported for UPnP. If value is unknown, key should not be present.
PaperMax	PaperMax	"<" replaced by "less-than-" ">" replaced by "greater-than-"
Punch	Punch	Value of "U" not supported for UPnP. If value is unknown, key should not be present.
Scan	N/A	If the device supports Scanning, the rs field (see above) will be present
Sort	Sort	Value of "U" not supported for UPnP. If value is unknown, key should not be present.
Staple	Staple	Value of "U" not supported for UPnP. If value is unknown, key should not be present.

Printer TXT Record Keys

Bonjour Key	UPnP Key	Notes
ADF	ADF	
Button	Button	
Camera	Camera	
Color	Color-Scan	Added Scan to disambiguate from Print.
Duplex	Duplex	
Glass	Glass	
Monochrome	Monochrome-Scan	Added Scan to disambiguate from Print.
OCR	OCR	
TMA	TMA	

5 References

UPnP-pntr-Printer-v1-Device-20081015 (Printer:1)

UPnP-pntr-PrintBasic-v1-Service-20020808 (PrintBasic:1)

UPnP-pntr-PrintEnhanced-v1-Service-20061028 (PrintEnhancedLayout:1)
PWG 5100.12: Internet Printing Protocol 2.0 (IPP/2.0)
PWG 5100.xx IPP Everywhere
PWG 5100.xx IPP: Job and Printer Extensions - Set 3
RFC 2616: Hyper-Text Transport Protocol/1.1
RFC 2119: Key words for use in RFCs to Indicate Requirement Levels
RFC 2910: Internet Printing Protocol/1.1: Encoding and Transport
RFC 2911: Internet Printing Protocol/1.1: Model and Semantics
RFC 3196, Internet Printing Protocol/1.1: Implementer's Guide