

# HP Universal Print Driver

Overview and solutions for deployment methods



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# Introduction & Overview

This document is written to supplement the HP Universal Print Driver (UPD) System Administrator's Guide. For more technical information about the UPD and management applications, please refer to the HP UPD System Administrator's Guide.

The HP UPD was developed by HP to help you virtually eliminate the need for multiple printer drivers and more effectively manage your print environment. When deployed across your IT environment, this single, intelligent print driver greatly reduces printer-related IT tasks and help-desk calls along with improving the end-user printing experience. Office workers can enjoy the benefits of using a single driver for printing on virtually any HP print device.

In addition to end-users, IT benefits greatly from the deployment of the HP UPD and related management tools. IT resources typically spend a large percentage of time managing printer drivers and responding to printer-related issues. With the UPD, these resources will be reduced to focus on other strategic IT functions.

- If you have a goal of restricting access to printers or printer capabilities – such as color printing – the Managed Print Administration (MPA) tool and Active Directory (AD) templates allow you to establish and manage permissions for individuals, user groups, and groups of printers.

To gain the maximum benefit of this technology – it is important to:

- Fully understand your print environment.
- Inventory your printer fleet, including drivers and print servers.
- Develop a UPD deployment strategy.

Once you make this initial investment of planning and implementing the UPD, the payoff results in higher end-user satisfaction and IT cost savings. HP also has a professional, experienced consulting team available to help you deploy the UPD.

This white paper is designed to help you make strategic deployment decisions as you transform your print environment to a more streamlined and efficient UPD environment. The deployment of the UPD in your print environment will be unique based upon your specific objectives and current IT infrastructure. We have included specific insights from UPD subject-matter experts and prior customer experiences – including HP's own internal enterprise-wide deployment – to help you develop your deployment plan. HP has deployed the UPD at HP facilities worldwide and it has produced significant hard-cost savings, as well as other benefits, such as fewer help desk calls.

Our goal is to guide you through strategic and practical considerations as you plan your UPD deployment. Included in this document are:

- A decision tree, methodologies, and other resources to help you create an optimal print environment that saves you time, money, and resources.
- Recommendations and considerations that might help you determine whether you should actively manage your UPD environment using AD templates or the MPA.

# Assessment

**Inventory of Current Devices and Drivers:** Prior to planning your implementation, you must assess your current printing environment and inventory all printing devices, printer drivers, and page description languages (PDL) that you are using.

**PDL Considerations:** Some business applications rely on a specific version of Printer Control Language (PCL) or require Adobe® PostScript®. As a result, test that the applications you are using are compatible with the HP Universal Print Driver (UPD) versions of PCL and postscript emulation. If some applications are not compatible with the UPD versions of PCL and postscript emulation, you should retain the current drivers and queues for the non-compatible applications. Without considering these key points, you might encounter unexpected exceptions to your strategy.

- You will need to identify and address:
  - Specialty devices
  - Specific business applications, such as ERP
  - The use of certified drivers, such as SAP
  - Line printers
  - Large format printing devices
  - HP devices that feature edge-to-edge printing, which require product-specific drivers
  - Pre-HP LJ4000 devices
  - Non-HP devices
  - A well-defined plan that addresses these special needs, communicated prior to deployment, to prevent numerous issues.
- HP tests and supports the UPD only on HP devices that support PCL 5, PCL 6, or postscript emulation. Host-based and non-HP devices in your environment require an alternative to the UPD.
  - **Table 1** shows the capabilities among the HP PCL and PS drivers.

**Table 1** Printer driver breakdown

Driver	Details
HP PCL 5	<ul style="list-style-type: none"><li>● Recommended for general office Windows printing.</li><li>● Backward compatible with previous PCL versions or older HP LaserJet printers.</li><li>● Best choice for third-party or home-grown custom solutions (forms, fonts, and SAP programs) and mixed environments (UNIX, Linux, mainframe).</li></ul>
HP PCL 6	<ul style="list-style-type: none"><li>● Recommended for printing in all-Windows environments.</li><li>● Provides the best overall speed, print quality, and printer feature support for most users.</li><li>● Developed to align with Graphic Design Interface (GDI) for best speed in Windows environments.</li><li>● May not be fully compatible with third-party and custom solutions based on PCL 5.</li></ul>
HP Postscript	<ul style="list-style-type: none"><li>● Recommended for printing with Adobe or other highly graphics-intensive applications.</li><li>● Use for PS level 3 needs and PS font support.</li><li>● Slightly faster than PCL 6 when using Adobe applications.</li><li>● Best print compatibility between Apple Macintosh and Windows applications.</li></ul>

- HP strongly recommends that you consider the following steps prior to planning your UPD deployment.
  1. Validate that the UPD is compatible with your current environment and network communication protocols. Make sure that the SNMP and mDNS protocols are not being filtered or blocked. The UPD requires these protocols for discovery and communication with devices. Check the list below to make sure the UPD will work in your environment:
    - a. Verify SNMP communication is available.
    - b. Make sure mDNS broadcasts and IP multicast services are allowed on the network for the UPD to discover devices.
    - c. Activate the mDNS protocol on the printer/device using the Embedded Web Server (EWS).
    - d. SNMP Get Community names should maintain default Public names.
    - e. Bi-directional communication – between the HP UPD and printer – is required to gather device-specific configuration information.
    - f. In dynamic mode, the HP UPD will only discover devices within the same subnet when **Search for network printers** is selected.
  2. To create permanent instances of printers, ensure that the end-users have sufficient permissions and rights on their local machine, when needed.
  3. Verify UPD communication is allowed through firewalls.
  4. Make sure your third-party applications and/or home-grown applications are compatible with the UPD. Please check with your third-party provider.
  5. Port access is necessary for communication: The UPD uses the following ports on the installed systems and their respective devices.

**Table 2** Ports

System	Ports	
	UDP	TCP
UPD on server	161, 162, 5353	9100
UPD on client	68, 161, 162, 5353	9100
HP MPA server	67, 80	
Printer	161, 162, 5353	9100

# Planning

## Executive Sponsorship

Before you begin deployment, make sure that you re-affirm executive sponsorship across the business units where you will be making changes. This is essential to ensure cooperation and acceptance when taking inventory of the current environment and looking for exceptions. In addition, this will facilitate communication and compliance by end-users.

## Communication and Training

HP strongly suggests having a communication plan in place prior to beginning deployment of your HP Universal Print Driver (UPD). This helps overcome objections and ease the fears of end-users who might be worried about losing some of their printing functionality. Make sure your end-users and the IT staff members understand the benefits gained by using the UPD. Employ a survey to gauge customer satisfaction. Develop training reference materials and identify resources to help your end-users successfully transition to the UPD from standard device drivers. Include information about how to identify devices through the UPD.

## Pilot or Test Environment

We recommend that you create a test-environment strategy during your UPD implementation. Select a part of your printing environment that will not affect many users at a time to test the implementation prior to deploying it across the whole environment. Make sure this test environment is typical of the majority of your overall print environment. Testing will help minimize the impact of issues that could arise during implementation. Capture the results of your test for later use and for success stories that you can communicate to facilitate project acceptance.

## Phased Approach

HP strongly recommends a phased approach to deploying the HP UPD.

- HP found that deploying in a phased manner across the HP IT environments helped to minimize issues and provided valuable information about each type of environment.
- HP determined that phased deployments uncovered issues that could be documented and considered prior to the next phase.
- Deploying the UPD this way helped to increase the confidence of end-users and sponsors in the project.
- A UPD deployment needs to be considered similar to any other major change to your IT environment and should be treated accordingly. Make sure you back up your print servers and print queues.

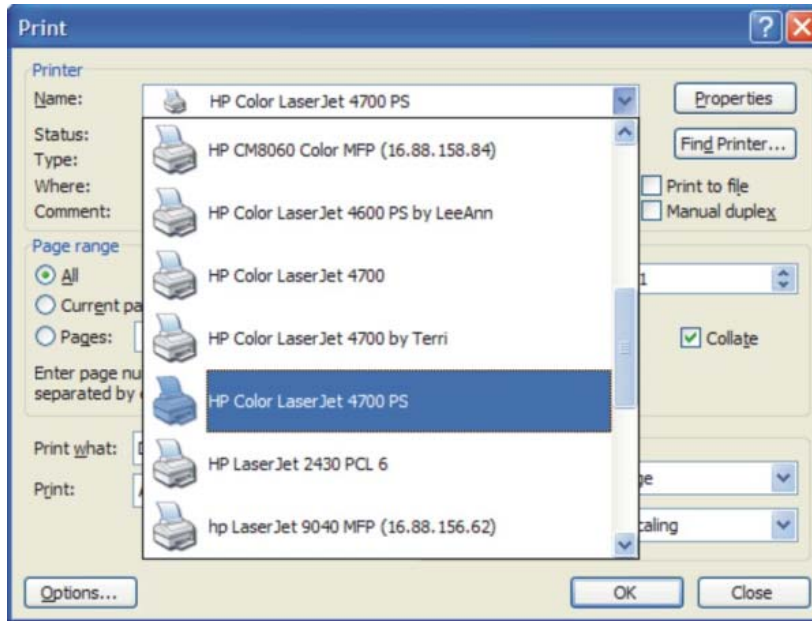
# Key Deployment Decisions

## Traditional and Dynamic Mode

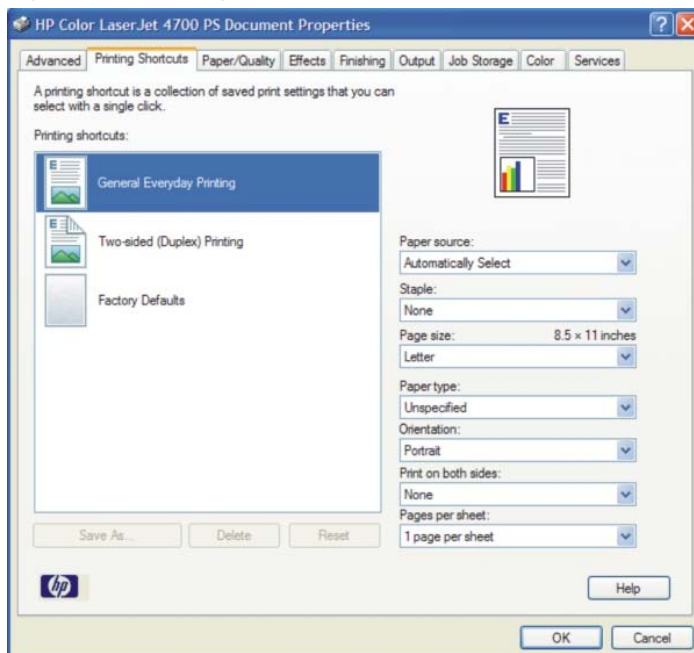
The HP Universal Print Driver (UPD) can operate in two different modes, traditional or dynamic.

- **Traditional mode** functions like the product-specific drivers you are accustomed to using. When installed in traditional mode, the HP UPD is associated with a specific print device, which can then be selected from the application print menu, as shown in **Figure 1**. Once selected, the HP UPD user interface is similar in appearance to a traditional, product-specific driver, as demonstrated by **Figure 2**.

**Figure 1** Print menu

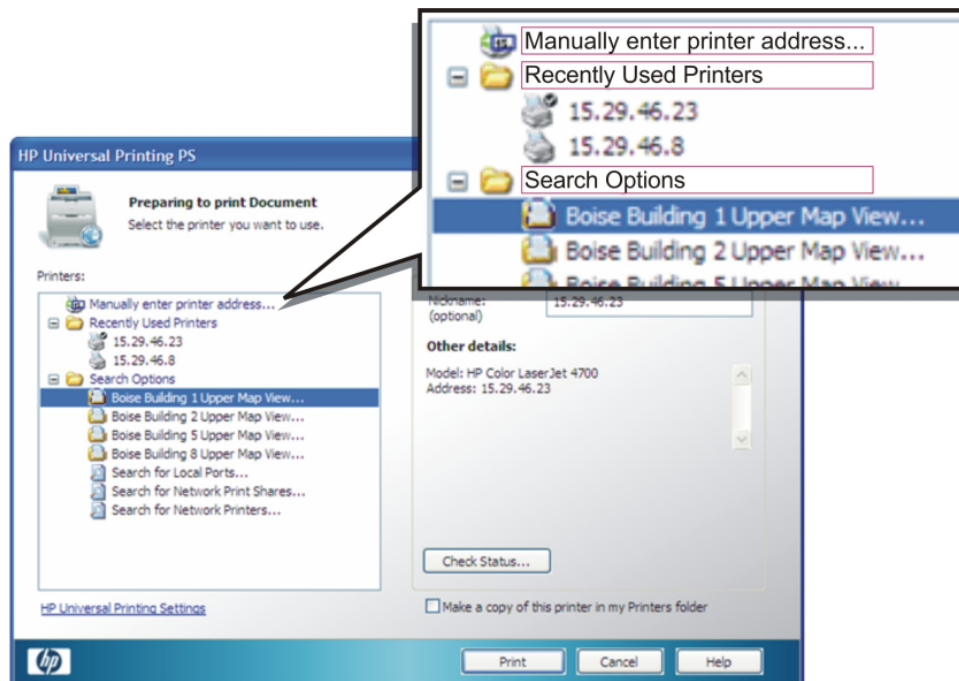


**Figure 2** Product-specific driver



- **Dynamic mode** allows you to find printers on a network. This is ideal when you are traveling or want to print to a new device in the office. An easy-to-use interface helps users connect to HP print devices on their own. There are four methods for finding printers in dynamic mode. **Figure 3** illustrates three of the four dynamic modes for finding a printer: Manually enter printer address, Recently Used Printers, Managed Printer Lists, or Search Options.

**Figure 3** Dynamic modes



## Color Access Control

This is an overview of managing Color Access Control (CAC).

- **Color Access Control** can be managed at different levels using the embedded web server (EWS), HP Web Jetadmin, black-only drivers, driver pre-configuration utility, and HP Managed Print Administration (MPA) or Active Directory (AD) Template.
- **The EWS can:**
  - Restrict** or allow up to 50 users to print in color.
  - Define** up to 10 software programs to restrict or allow color printing.
- **HP Web Jetadmin:**
  - Enables and disables** color printing on each device.
  - Allows** color by (1) user or (2) application or by (3) user and application.
- **HP UPD management tools:** Assign color access by user group, application, or Time of Day.
- **The HP UPD:**
  - Takes** precedence over other methods – all settings configured using the EWS or HP Web Jetadmin.
  - Has** no limitation on the number of users who have restricted color access.
  - Restricts** CAC to devices that do not support CAC within the EWS.

# Manage your UPD environment

Determine your purpose for using the HP Universal Print Driver (UPD). Do you want to help users find a printer easily while controlling who has access to printers and color printing? If your answer is **yes**, you need HP UPD management to employ web-based tools and/or policy templates within Active Directory (AD).

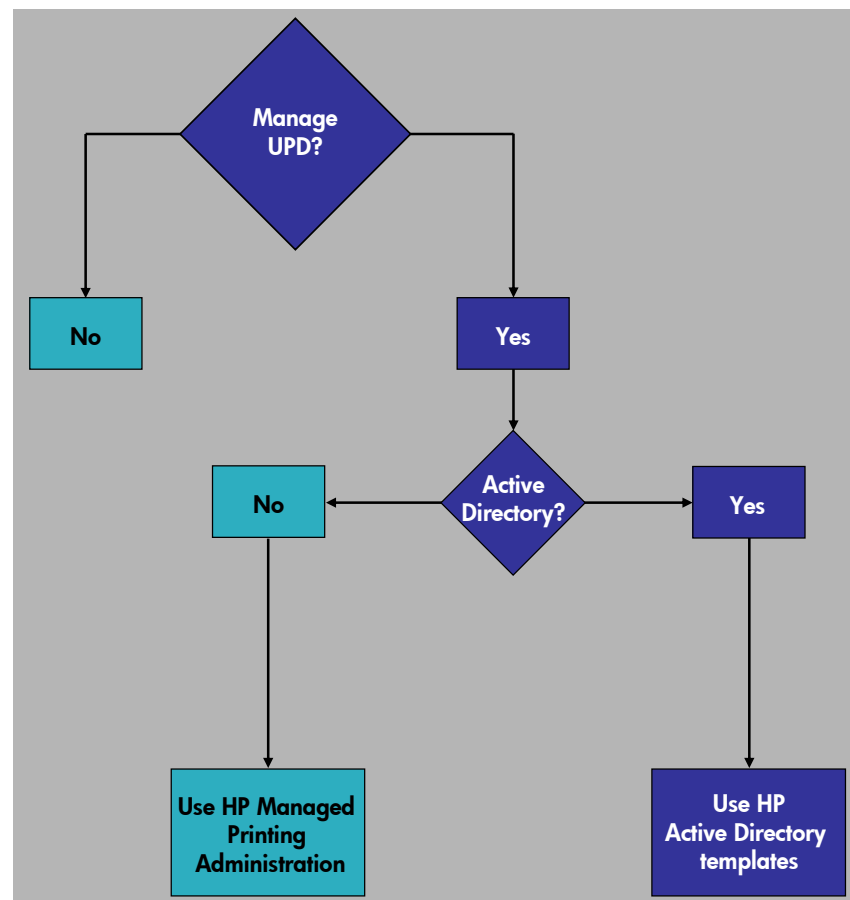
- Use the HP Managed Print Administration (MPA) software or AD templates to create User Groups or Managed Print Policies (MPPs) that manage functions such as notification and color access control.
  - HP MPA software also allows you to create Managed Printer Lists (MPLs) to help users quickly find a printer.
  - Both provide an automated method to create a controlled and customized print environment.

**MPA:** The UPD connects to the MPA server, which identifies the user, policies, and printer list. The MPA server then sets up the local user registry.

**AD:** The UPD permissions are assigned per user through Group Policy Objects in AD.

- **Figure 4** illustrates the decision-making process involved in managing the UPD.

**Figure 4** Decision tree





- Here are some considerations:
  - If you currently use AD to manage all of your users, groups, and policies, then the AD Administration Template should be considered because you will be able to use the existing infrastructure.

If the AD groups are not well-structured, using an AD template becomes a user-by-user configuration process. The benefit of using an AD template is lost in this scenario.
  - However, if you have a smaller, more manageable group of users and are not currently using AD to manage your users and groups, then consider installing the HP MPA software to create policies for users and groups to control the UPD capabilities.
  - You might want to provide custom printer lists and views to the users while retaining a policy from AD. In this situation, you will need to use an AD template and the HP MPA together. Use the AD template to configure user and group policies. Use the MPA to create MPLs and views. In this case, you would be using an MPA resource, not the MPA itself. When using policies, you must use either an AD template or the HP MPA, but not both. You can use either MPA or AD to manage policies, but must use MPA to manage the MPL.

# HP UPD deployment solution options

## Match your IT profile and objectives to deployment solution options

This section contains details for seven common IT environments. Review the server and client objectives to determine which profile most closely resembles your IT environment and which HP Universal Print Driver (UPD) deployment paths to follow. Every IT environment is different, so more than one profile might apply to your local environment.

**Table 3** Profile locations

Profile	Page number
1. Microsoft Client/Server Print Environment	12
2. Microsoft Cluster Server	15
3. Microsoft Windows Terminal Server	16
4. Citrix	17
5. Novell® iPrint®	19
6. Novell® NDPS®	21
7. Direct IP	23

- The **red** numbers (and descriptions) in **Possible server solutions** and **Possible client solutions** match the listing of all server and client solutions, which can be found in the **HP UPD deployment options table**.
- See the **Appendix** to review all solutions in the **HP UPD deployment options table** on page 27.

### Note

If you decide that you want to enable Management for the HP UPD via the Active Directory (AD) Templates or Managed Print Administration (MPA) software, you must modify the install script (**install.exe**) to enable management for your needs. **Table 3** lists the additional switches that need to be included in the install command.

**Table 4** Enable policy management:  
Choose the correct switch for the management solution

Switch	Management solution
<b>/empa</b>	Enables management via MPA and assumes the MPA server resides on a server called <b>Managed-Print</b>
<b>/policy"servername"</b>	Enables policy management via MPA and points the UPD to the server named in parenthesis as the location where MPA resides.
<b>/eads</b>	Enables policy management via the AD Admin Template only

## Profile One – Microsoft Client/Server Print Environment

- You have a Microsoft Client/Server Print Environment running one or more print servers that host print queues with a variety of drivers. Your PC clients connect to these queues via Point and Print.
- The workforce you support includes mobile workers who require flexible printing capabilities.
- For your consideration: When installing the UPD in this environment, server installation is Traditional Mode only.

**Table 5** Server Solutions: Microsoft Client/Server Print Environment

Objectives	Possible solutions	Details	Pros	Cons	More info.
Replace HP product-specific drivers with HP UPD	2 – Migrate existing queues to UPD	<ul style="list-style-type: none"> <li>• Installer with PQ Migrate can be used for the same driver name for specific printers, not PDL types, such as PCL 6. For example, <b>install/pqmigrate "HP LaserJet 9050 Series PCL 5"</b> This switch will tell the server to install the UPD and migrate every printer queue on the server using the specific driver listed in quotation marks.</li> <li>• To use MPA or AD templates, use <b>install.exe</b> as the install method and use the policy switches described on <b>page 10</b>.</li> </ul>	Printer queues, names, shares, and printers are retained	In most cases, the print queue settings and properties will be reset to the default after using the PQ Migrate option	<a href="#">HP UPD System Admin. Guide</a>
	3 – Migrate queues to UPD using <b>Printer Properties &gt; Advanced &gt; new driver</b>	Changing the printer driver on one queue forces other queues that use the same driver to be migrated to UPD as well	UPD behaves similar to product-specific driver	<ul style="list-style-type: none"> <li>• Traditional mode only</li> <li>• No compatibility with management tools (unless you run <b>install.exe</b> after migration)</li> <li>• Requires a more manual process</li> </ul>	<a href="#">HP UPD System Admin. Guide</a>

**Table 5** Server Solutions: Microsoft Client/Server Print Environment

Objectives	Possible solutions	Details	Pros	Cons	More info.
<p><b>Remove Print Servers</b></p>	<p>4 – Move to a direct IP printing model</p>	<ul style="list-style-type: none"> <li>Remove print servers and print directly to a printer from the client.</li> <li>Install UPD on client. For example, use software distribution tools such as MS SMS, Tivoli, custom installers, or a server using login scripts or batch files. You will need to determine your user experience for Direct IP printing. For example, users can add printers via Dynamic Mode or queues can be created via Traditional Mode. The script example of <b>install/ q/h/dst/dm</b> has these attributes: <b>/q</b> Quiet mode, no prompts; <b>/h</b> Hides the install dialog; <b>/dst</b> Disables the Services Tab in the HP UPD; <b>/dm</b> Installs the printer in Dynamic Mode</li> <li>To use MPA or AD templates, use <b>install.exe</b> as the install method. If you decide to present printer lists to clients for dynamic mode, then consider using MPA or AD templates</li> </ul>	<p>Cost savings are achieved because of:</p> <ul style="list-style-type: none"> <li>No server hardware</li> </ul>	<ul style="list-style-type: none"> <li>No centralized print queue management</li> <li>No centralized print driver management</li> <li>Existing client print queues will have to be manually deleted</li> </ul>	<p><a href="#">HP UPD System Admin. Guide</a></p>

**Table 6** Client Solutions: Microsoft Client/Server Print Environment

Objectives	Possible solutions	Details	Pros	Cons	More info.
<b>Continue Point and Print environment</b>	<b>1</b> – No change in workflow – Point and Print	<ul style="list-style-type: none"> <li>• Clients can use existing architecture as UPD supports the Point and Print model</li> <li>• No disruption to client printing environment</li> </ul>	<ul style="list-style-type: none"> <li>• This solution requires no client training</li> <li>• Centralized print queue management</li> <li>• Automatic print driver distribution</li> </ul>	<ul style="list-style-type: none"> <li>• Server hardware required</li> <li>• Color access control settings in the MPA or AD templates are not transferred to the client</li> </ul>	<a href="#">HP UPD AD Admin. Template</a>
<b>Pre-configure driver defaults</b>	<b>4</b> – Pre-configure the UPD	<ul style="list-style-type: none"> <li>• Use the HP Driver Pre-configuration Utility to pre-configure the UPD.</li> <li>• Then, install UPD on client. For example, use software distribution tools such as MS SMS, Tivoli, custom installers, or a server using login scripts or batch files. Script example: <b>install/ q/h/dst/dm</b> is explained as <b>/q</b> Quiet mode, no prompts; <b>/h</b> Hides the install dialog; <b>/dst</b> Disables the Services Tab in the HP UPD; <b>/dm</b> Installs the printer in Dynamic Mode.</li> </ul>	These settings can be pre-configured and, in some cases, locked: Duplex, Orientation, Grayscale, Print Quality, Paper Size, Media Type. Advanced features can also be pre-configured, such as Scale to Fit or Watermarks, and Status Notification Prompts (SNP)	Microsoft WHQL certification breaks because the configuration file is modified	<a href="#">HP Driver Pre-configuration Utility</a>
<b>Mobile-user printing</b>	<b>2</b> – Install UPD locally in dynamic mode	<ul style="list-style-type: none"> <li>• Enables the user to search for networked printers using IP address, browsing, or printer lists.</li> <li>• Install UPD on client. For example, use software distribution tools such as MS SMS, Tivoli, custom installers, or a server using login scripts or batch files. The script example of <b>install/ q/h/dst/dm</b> has these attributes: <b>/q</b> Quiet mode, no prompts; <b>/h</b> Hides the install dialog; <b>/dst</b> Disables the Services Tab in the HP UPD; <b>/dm</b> Installs the printer in Dynamic Mode</li> </ul>	<ul style="list-style-type: none"> <li>• Can create a permanent instance by adding printer to Printer/Faxes folder</li> <li>• User search capabilities can be managed by MPA or AD templates</li> </ul>	<ul style="list-style-type: none"> <li>• When creating a permanent instance, the user needs to have local administrative rights</li> <li>• Jobs must be cancelled at the device or on the client</li> </ul>	<a href="#">HP UPD AD Admin. Template</a>
<b>Print to printshares in Dynamic Mode (MPL)</b>	<b>6</b> – Manage users when printing to printshares through managed printer lists (MPLs)	Users printing through printshares, mapped within MPL, can be managed via MPA or AD templates	Policies such as Color Access Control or duplex are applied to the client		<a href="#">HP UPD System Admin. Guide</a>

## Profile Two – Microsoft Cluster Print Environment

Your Microsoft Cluster environment has print queues shared on the virtual server. Clients connect to print queues and obtain drivers and updates through Point and Print.

The UPD client and server objectives are the same as Profile 1. The difference is the UPD installation routine of the Cluster Server, which is described below.

When installing the HP UPD in a Cluster environment, you must first install the UPD and then create a printer (UPD driver initialization occurs at this time) on each node that will compose the virtual server. After this process, the created printers on the nodes can be deleted.

- For example, to install the UPD on one or more nodes, use the following command.
  - Install `/smlpt1 /n"temp printer"`
- Installing the UPD on each node only has to be done one time and not each time you install a printer on the cluster.
  - For more information, see the white paper **Print drivers in Cluster Environment**, which is available at the following website: <http://www.hp.com/go/UPD>
  - For objectives, see **Profile 1: Microsoft Client/Server Print Environment**.

## Profile Three – Microsoft Windows Terminal Server

You work in a Microsoft Windows Terminal Server environment using Microsoft Windows 2003 Terminal Services SP1. Print queues, where clients connect, are shared using HP device drivers.

- For your consideration: When installing the UPD in this environment, server installation is Traditional Mode only.

**Table 7** Server solutions: Microsoft Windows Terminal Services

Objectives	Possible solutions	Details	Pros	Cons	More info.
<b>Replace HP product-specific drivers with HP UPD</b>	<b>5</b> – Map UPD as the fallback printer driver in Microsoft Windows 2003 Terminal Services SP1	Map UPD as the fallback driver for auto-created printers	<ul style="list-style-type: none"> <li>• Clients can use existing printing model to print</li> <li>• Clients are presented with one driver interface</li> </ul>	Traditional mode only	* <a href="#">Citrix Server white paper</a>

**Table 8** Client solutions: Microsoft Windows Terminal Services

Objectives	Possible solutions	Details	Pros	Cons	More info.
<b>Mobile-user printing</b>	<b>2</b> – Install UPD locally in dynamic mode	<ul style="list-style-type: none"> <li>• Enables the user to search for networked printers using IP address, browsing, or printer lists</li> <li>• Install UPD on client. For example, use software distribution tools such as MS SMS, Tivoli, custom installers, or a server using login scripts or batch files. The script example of <b>install/q/h/dst/dm</b> has these attributes: <b>/q</b> Quiet mode, no prompts; <b>/h</b> Hides the install dialog; <b>/dst</b> Disables the Services Tab in the HP UPD; <b>/dm</b> Installs the printer in Dynamic Mode</li> </ul>	<ul style="list-style-type: none"> <li>• Can create a permanent instance by adding printer to Printer/Faxes folder</li> <li>• User search capabilities can be managed by MPA or AD templates</li> </ul>	<ul style="list-style-type: none"> <li>• When creating a permanent instance, the user needs to have local administrative rights</li> <li>• Jobs must be cancelled at the device or on the client</li> </ul>	<a href="#">HP UPD AD Admin. Template</a>
<b>During remote session, use print queues on the Windows Terminal Server</b>	<b>5</b> – Print to network-connected printers	Install UPD locally (with MPLs) or connect to shared queues on servers	Centralized queue and drive management		* <a href="#">Citrix Server white paper</a>

## Profile Four – Citrix

You work in a Citrix environment. Print queues, where clients connect, are shared using HP device drivers.

- For your consideration: When installing the UPD in this environment, server installation is Traditional Mode only.

**Table 9** Server solutions: Citrix

Objectives	Possible solutions	Details	Pros	Cons	More info.
<b>Replace HP product-specific drivers with HP UPD</b>	<b>6</b> – Map UPD to re-direct drivers using driver mapping in the Citrix management tools	Map auto-created printers to the UPD so that the locally installed printers are available to the clients when they are connected within the Citrix session.	Jobs print directly to IP-connected printers without routing through the client	The HP UPD might generate a larger printing file size than the Citrix UPD driver	* <a href="#">Citrix Server white paper</a>

**Table 10** Client solutions: Citrix

Objectives	Possible solutions	Details	Pros	Cons	More info.
<b>Mobile-user printing</b>	<b>2</b> – Install UPD locally in dynamic mode	<ul style="list-style-type: none"> <li>• Enables the user to search for networked printers using IP address, browsing, or printer lists</li> <li>• Install UPD on client. For example, use software distribution tools such as MS SMS, Tivoli, custom installers, or a server using login scripts or batch files. The script example of <b>install/ q/h/dst/dm</b> has these attributes: <b>/q</b> Quiet mode, no prompts; <b>/h</b> Hides the install dialog; <b>/dst</b> Disables the Services Tab in the HP UPD; <b>/dm</b> Installs the printer in Dynamic Mode</li> </ul>	<ul style="list-style-type: none"> <li>• Can create a permanent instance by adding printer to Printer/Faxes folder</li> <li>• User search capabilities can be managed by MPA or AD templates</li> </ul>	<ul style="list-style-type: none"> <li>• When creating a permanent instance, the user needs to have local administrative rights</li> <li>• Jobs must be cancelled at the device or on the client</li> </ul>	<a href="#">HP UPD AD Admin. Template</a>
<b>During remote session, use print queues on the Windows Terminal Server</b>	<b>5</b> – Print to network-connected printers that reside as print shares on the print server	Install UPD locally (with MPLs) or connect to shared queues on servers	Centralized queue and drive management		* <a href="#">Citrix Server white paper</a>



**Table 10** Client solutions: Citrix

Objectives	Possible solutions	Details	Pros	Cons	More info.
<p><b>Migrate existing client printers to UPD</b></p>	<p>7 – Migrate existing queues to UPD</p>	<ul style="list-style-type: none"> <li>• Installer with PQ Migrate can be used for the same driver name for specific printers, not PDL types, such as PCL 6. For example, <b>install/ pqmigrate "HP LaserJet 9050 Series PCL 5"</b> This switch will tell the server to install the UPD and migrate every printer queue on the server using the specific driver listed in quotation marks.</li> <li>• To use MPA or AD templates, use <b>install.exe</b> as the install method.</li> </ul>	<p>Printer queues, names, shares, and printers are retained</p>	<p>In most cases, the print queue settings and properties will be reset to the default after using the PQ Migrate option</p>	<p><a href="#">HP UPD System Admin. Guide</a></p>

\* The complete name of the white paper is **HP Printers Supported in Citrix Presentation Server Environments**.

## Profile Five – Novell® iPrint®

You have a Novell print environment using iPrint, where clients connect and install printers from maps and lists.

- For your consideration: When installing the UPD in this environment, server installation is Traditional Mode only.

**Table 11** Server solutions: Novell iPrint

Objectives	Possible solutions	Details	Pros	Cons	More info.
<b>Replace HP product-specific drivers with HP UPD</b>	<b>7</b> – Map or install UPD driver using the standard Novell iPrint driver/Printer management tools	Use iPrint Printer management tools to add or install the UPD driver to the server	<ul style="list-style-type: none"> <li>• Uses the same workflow process as product-specific drivers</li> <li>• Single driver on the server</li> </ul>		<a href="#">HP UPD System Admin. Guide</a>
<b>Switching from iPrint to UPD managed environment</b>	<b>1</b> – Install new UPD print queues	<ul style="list-style-type: none"> <li>• Install a print queue using Add Printer Wizard or <b>install.exe</b> and share the queues</li> <li>• To use MPA or AD templates, use <b>install.exe</b> as the install method.</li> </ul>	Uses the same workflow process as product-specific drivers	<ul style="list-style-type: none"> <li>• Printing settings will be under Printing Preferences instead of Device Settings</li> <li>• When using Add Printer Wizard, the policy is disabled</li> </ul>	<a href="#">HP UPD System Admin. Guide</a>

**Table 12** Client solutions: Novell iPrint

Objectives	Possible solutions	Details	Pros	Cons	More info.
<b>Preset Driver Defaults</b>	<b>4</b> – Pre-configure the UPD	<ul style="list-style-type: none"> <li>• Use the HP Driver Pre-configuration Utility to pre-configure the UPD.</li> <li>• Use the HP Driver Pre-configuration Utility to pre-configure the UPD.</li> <li>• Then, install UPD on client. For example, use software distribution tools such as MS SMS, Tivoli, custom installers, or a server using login scripts or batch files. Script example: <b>install/q/h/dst/dm</b> is explained as <b>/q</b> Quiet mode, no prompts; <b>/h</b> Hides the install dialog; <b>/dst</b> Disables the Services Tab in the HP UPD; <b>/dm</b> Installs the printer in Dynamic Mode.</li> </ul>	These settings can be pre-configured and sometimes locked: Duplex, Orientation, Grayscale, Print Quality, Paper Size, Media Type. Advanced features can also be pre-configured, such as Scale to Fit or Watermarks, and Status Notification Prompts (SNP)	Microsoft WHQL certification breaks because the configuration file is modified	<a href="#">HP Driver Pre-configuration Utility</a>

**Table 12** Client solutions: Novell iPrint

Objectives	Possible solutions	Details	Pros	Cons	More info.
Mobile-user printing	2 – Install UPD locally in dynamic mode	<ul style="list-style-type: none"> <li>Enables the user to search for networked printers using IP address, browsing, or printer lists</li> <li>Install UPD on client. For example, use software distribution tools such as MS SMS, Tivoli, custom installers, or a server using login scripts or batch files. The script example of <b>install/ q/h/dst/dm</b> has these attributes: <b>/q</b> Quiet mode, no prompts; <b>/h</b> Hides the install dialog; <b>/dst</b> Disables the Services Tab in the HP UPD; <b>/dm</b> Installs the printer in Dynamic Mode</li> </ul>	Can create a permanent instance by adding printer to Printer/Faxes folder	<ul style="list-style-type: none"> <li>When creating a permanent instance, the user needs to have local administrative rights</li> <li>Jobs must be cancelled at the device or on the client</li> </ul>	<a href="#">HP UPD AD Admin. Template</a>
During remote session, use print queues on the Windows Terminal Server	2 – Install UPD locally in dynamic mode	<ul style="list-style-type: none"> <li>Enables the user to search for networked printers using IP address, browsing, or printer lists</li> <li>Install UPD on client. For example, use software distribution tools such as MS SMS, Tivoli, custom installers, or a server using login scripts or batch files. The script example of <b>install/ q/h/dst/dm</b> has these attributes: <b>/q</b> Quiet mode, no prompts; <b>/h</b> Hides the install dialog; <b>/dst</b> Disables the Services Tab in the HP UPD; <b>/dm</b> Installs the printer in Dynamic Mode</li> </ul>	<ul style="list-style-type: none"> <li>Can create a permanent instance by adding printer to Printer/Faxes folder</li> <li>User search capabilities can be managed by MPA or AD templates</li> </ul>	<ul style="list-style-type: none"> <li>When creating a permanent instance, the user needs to have local administrative rights</li> <li>Jobs must be cancelled at the device or on the client</li> </ul>	<a href="#">HP UPD AD Admin. Template</a>
	5 – Print to network-connected printers	Install UPD locally (with MPLs) or connect to shared queues on servers	Centralized queue and drive management		* <a href="#">Citrix Server white paper</a>

\* The complete name of the white paper is **HP Printers Supported in Citrix Presentation Server Environments**.

## Profile Six – Novell® NDPS®

You have a Novell print environment using NDPS for sharing printers.

- For your consideration: When installing the UPD in this environment, server and client installation is Traditional Mode only.
- When using the UPD in NDPS environments, the printer IP address is not supplied to the UPD. Therefore, the device-specific components are not identified. This means that printer-specific features are not available to the clients, such as:
  - Color printing
  - Duplex printing
  - Stapling

**Table 13** Server solutions: Novell NDPS

Objectives	Possible solutions	Details	Pros	Cons	More info.
<b>Replace HP product-specific drivers with HP UPD</b>	<b>8</b> – Map or install UPD driver using Novell NDPS Netware Administrator	Use <b>hpmcddp?.inf</b> file to map or install the UPD driver to the server	<ul style="list-style-type: none"> <li>• Uses the same workflow process as product-specific drivers</li> <li>• Single driver on the server</li> </ul>	<ul style="list-style-type: none"> <li>• Traditional mode only</li> <li>• No SNMP communication possible to get device-specific configuration</li> </ul>	<a href="#">HP UPD System Admin. Guide</a>
<b>Switching from NDPS to UPD managed environment</b>	<b>1</b> – Install new UPD print queues	<ul style="list-style-type: none"> <li>• Install a print queue using Add Printer Wizard or <b>install.exe</b> and share the queues</li> <li>• To use MPA or AD templates, use <b>install.exe</b> as the install method and use the policy switches described on <b>page 11</b>.</li> </ul>	Uses the same workflow process as product-specific drivers	<ul style="list-style-type: none"> <li>• Printing settings will be under Printing Preferences instead of Device Settings</li> <li>• When using Add Printer Wizard, the policy is disabled</li> </ul>	<a href="#">HP UPD System Admin. Guide</a>

**Table 14** Client solutions: Novell NDPS

Objectives	Possible solutions	Details	Pros	Cons	More info.
<b>Print Driver Defaults</b>	<b>4</b> – Pre-configure the UPD	<ul style="list-style-type: none"> <li>• Use the HP Driver Pre-configuration Utility to pre-configure the UPD.</li> <li>• Then, install UPD on client. For example, use software distribution tools such as MS SMS, Tivoli, custom installers, or a server using login scripts or batch files. Script example: <b>install/q/h/dst/dm</b> is explained as <b>/q</b> Quiet mode, no prompts; <b>/h</b> Hides the install dialog; <b>/dst</b> Disables the Services Tab in the HP UPD; <b>/dm</b> Installs the printer in Dynamic Mode.</li> </ul>	These settings can be pre-configured and, in some cases, locked: Duplex, Orientation, Grayscale, Print Quality, Paper Size, Media Type. Advanced features can also be pre-configured, such as Scale to Fit or Watermarks, and Status Notification Prompts (SNP)	Microsoft WHQL certification breaks because the configuration file is modified	<a href="#">HP Driver Pre-configuration Utility</a>

**Table 14** Client solutions: Novell NDPS

Objectives	Possible solutions	Details	Pros	Cons	More info.
Mobile-user printing	<p>2 – Install UPD locally in dynamic mode</p>	<ul style="list-style-type: none"> <li>Enables the user to search for networked printers using IP address, browsing, or printer lists</li> <li>Install UPD on client. For example, use software distribution tools such as MS SMS, Tivoli, custom installers, or a server using login scripts or batch files. The script example of <b>install/ q/h/dst/dm</b> has these attributes: <b>/q</b> Quiet mode, no prompts; <b>/h</b> Hides the install dialog; <b>/dst</b> Disables the Services Tab in the HP UPD; <b>/dm</b> Installs the printer in Dynamic Mode</li> </ul>	<ul style="list-style-type: none"> <li>Can create a permanent instance by adding printer to Printer/Faxes folder</li> <li>User search capabilities can be managed by MPA or AD templates</li> </ul>	<ul style="list-style-type: none"> <li>When creating a permanent instance, the user needs to have local administrative rights</li> <li>Jobs must be cancelled at the device or on the client</li> </ul>	<a href="#">HP UPD AD Admin. Template</a>
Connect clients to new UPD shares	<p>3 – Install UPD locally in traditional mode</p> <p><b>Note</b> If you plan on managing UPD, you must use the <b>install.exe</b> method.</p>	<p>Install UPD on client. For example, use software distribution tools such as MS SMS, Tivoli, custom installers, or a server using login scripts or batch files. Create a static printer on the client using the following script: <b>install /sm&lt;port or printer IP address&gt; /n"printer name"</b></p> <p>Alternatively, choosing the UPD driver when creating a printer via Add Printer Wizard is an option.</p> <p><b>Note</b> When installing UPD in traditional mode, a printer must be created.</p>	Static queue	<ul style="list-style-type: none"> <li>Driver deployment and maintenance require scripting</li> <li>Policy management will be disabled when the UPD is installed via Add Printer Wizard</li> </ul>	<a href="#">HP UPD System Admin. Guide</a>

## Profile Seven – Direct IP

Your Direct IP environment uses locally-installed device drivers at the client. End-users print directly to the devices.

- For your consideration: When installing the UPD in this environment, client installation can be either Traditional or Dynamic mode.

**Table 15** Server solutions: Direct IP

Objectives	Possible solutions	Details	Pros	Cons	More info.
Replace HP product-specific drivers with HP UPD	4 – Move to a direct IP printing model	<ul style="list-style-type: none"> <li>• Remove print servers and print directly to a printer from the client.</li> <li>• Install UPD on client. For example, use software distribution tools such as MS SMS, Tivoli, custom installers, or a server using login scripts or batch files. You will need to determine your user experience for Direct IP printing. For example, users can add printers via Dynamic Mode or queues can be created via Traditional Mode. The script example of <b>install/ q/h/dst/dm</b> has these attributes: <b>/q</b> Quiet mode, no prompts; <b>/h</b> Hides the install dialog; <b>/dst</b> Disables the Services Tab in the HP UPD; <b>/dm</b> Installs the printer in Dynamic Mode</li> <li>• To use MPA or AD templates, use <b>install.exe</b> as the install method. If you decide to present printer lists to clients for dynamic mode, then consider using MPA or AD templates</li> </ul>	<p>Cost savings are achieved because of:</p> <ul style="list-style-type: none"> <li>• Reduced cost in hardware support and maintenance</li> </ul>	<ul style="list-style-type: none"> <li>• No centralized print queue management</li> <li>• No centralized print driver management</li> <li>• Existing client print queues will have to be manually deleted</li> </ul>	<a href="#">HP UPD System Admin. Guide</a>

**Table 16** Client solutions: Direct IP

Objectives	Possible solutions	Details	Pros	Cons	More info.
<p><b>Client discovers and installs devices</b></p>	<p><b>2</b> – Install UPD on each client locally in dynamic mode</p>	<ul style="list-style-type: none"> <li>Enables the user to search for networked printers using IP address, browsing, or printer lists.</li> <li>Install UPD on client. For example, use software distribution tools such as MS SMS, Tivoli, custom installers, or a server using login scripts or batch files. The script example of <b>install/ q/h/dst/dm</b> has these attributes: <b>/q</b> Quiet mode, no prompts; <b>/h</b> Hides the install dialog; <b>/dst</b> Disables the Services Tab in the HP UPD; <b>/dm</b> Installs the printer in Dynamic Mode</li> </ul>	<ul style="list-style-type: none"> <li>Can create a permanent instance by adding printer to Printer/Faxes folder</li> <li>User search capabilities can be managed by MPA or AD templates</li> </ul>	<ul style="list-style-type: none"> <li>Printers must be installed at the client PCs</li> <li>When creating a permanent instance, the user needs to have local administrative rights</li> <li>Jobs must be cancelled at the device or on the client</li> </ul>	<p><a href="#">HP UPD AD Admin. Template</a></p>

## Conclusion

Thank you for choosing HP and the HP Universal Print Driver (UPD). HP hopes that this white paper has assisted you in making the critical decisions necessary for the installation and deployment of the HP UPD. More detailed information about the technical aspects of deploying the UPD in your environment is available. The links to this information are listed below. HP has consulting professionals available who can help you with all aspects of the UPD deployment. Contact your HP sales representative or consulting professional.

## For more information

### UPD Reference Materials and Tools

Please reference these source materials for more detailed information about the HP UPD and for step-by-step installation steps.

[System Administrator's Guide](#)

[Managed Printing Administration Guide](#) – part of the System Administrator's Guide

[Active Directory Administrator Template White Paper](#)

To locate all HP UPD documentation on the HP website, go to:

<http://www.hp.com/go/upd> and select the **Documentation** tab.



# Appendix

## HP UPD deployment options table

These solutions relate to the profiles and objectives.

### Server solutions

**Table 17** Server solutions

No.	Possible solutions	Details	Pros	Cons	More info.
1	Install new UPD print queues	<ul style="list-style-type: none"> <li>Install a print queue using Add Printer Wizard or <b>install.exe</b> and share the queues</li> <li>To use MPA or AD templates, use <b>install.exe</b> as the install method and use the policy switches described on <b>page 10</b>.</li> </ul>	Uses the same workflow process as product-specific drivers	<ul style="list-style-type: none"> <li>Printing settings will be under Printing Preferences instead of Device Settings</li> <li>When using Add Printer Wizard, the policy is disabled</li> </ul>	<a href="#">HP UPD System Admin. Guide</a>
2	Migrate existing queues to UPD	<ul style="list-style-type: none"> <li>Installer with PQ Migrate can be used for the same driver name for specific printers, not PDL types, such as PCL 6. For example, <b>install/pqmigrate "HP LaserJet 9050 Series PCL 5"</b> This switch will tell the server to install the UPD and migrate every printer queue on the server using the specific driver listed in quotation marks.</li> <li>To use MPA or AD templates, use <b>install.exe</b> as the install method.</li> </ul>	Printer queues, names, shares, and printers are retained	In most cases, the print queue settings and properties will be reset to the default after using the PQ Migrate option	<a href="#">HP UPD System Admin. Guide</a>
3	Migrate queues to UPD using <b>Printer Properties &gt; Advanced &gt; new driver</b>	Changing the printer driver on one queue forces other queues that use the same driver to be migrated to UPD as well	UPD behaves similar to product-specific driver	<ul style="list-style-type: none"> <li>Traditional mode only</li> <li>No compatibility with management tools (unless you run <b>install.exe</b> after migration)</li> <li>Requires a more manual process</li> </ul>	<a href="#">HP UPD System Admin. Guide</a>

**Table 18** Server solutions

No.	Possible solutions	Details	Pros	Cons	More info.
4	Move to a direct IP printing model	<ul style="list-style-type: none"> <li>Remove print servers and print directly to a printer from the client.</li> <li>Install UPD on client. For example, use software distribution tools such as MS SMS, Tivoli, custom installers, or a server using login scripts or batch files. You will need to determine your user experience for Direct IP printing. For example, users can add printers via Dynamic Mode or queues can be created via Traditional Mode. The script example of <b>install/ q/h/dst/dm</b> has these attributes: <b>/q</b> Quiet mode, no prompts; <b>/h</b> Hides the install dialog; <b>/dst</b> Disables the Services Tab in the HP UPD; <b>/dm</b> Installs the printer in Dynamic Mode</li> <li>To use MPA or AD templates, use <b>install.exe</b> as the install method. If you decide to present printer lists to clients for dynamic mode, then consider using MPA or AD templates</li> </ul>	<p>Cost savings are achieved because of:</p> <ul style="list-style-type: none"> <li>No centralized print queue management</li> <li>No server hardware</li> </ul>	<ul style="list-style-type: none"> <li>No centralized print queue management</li> <li>No centralized print driver management</li> <li>Existing client print queues will have to be manually deleted</li> </ul>	<a href="#">HP UPD System Admin. Guide</a>
5	Map UPD as the fallback printer driver in Microsoft Windows 2003 Terminal Services SP1	Map UPD as the fallback driver for auto-created printers	<ul style="list-style-type: none"> <li>Clients can use existing printing model to print</li> <li>Clients are presented with one driver interface</li> </ul>	Traditional mode only	* <a href="#">Citrix Server white paper</a>
6	Map UPD to re-direct drivers using driver mapping in the Citrix management tools	Map auto-created printers to the UPD	Jobs print directly to IP-connected printers without routing through the client	The HP UPD might generate a larger printing file size than the Citrix UPD driver	* <a href="#">Citrix Server white paper</a>
7	Map or install UPD driver using the standard Novell iPrint driver/Printer management tools	Use iPrint Printer management tools to add or install the UPD driver to the server	<ul style="list-style-type: none"> <li>Uses the same workflow process as product-specific drivers</li> <li>Single driver on the server</li> </ul>		<a href="#">HP UPD System Admin. Guide</a>
8	Map or install UPD driver using Novell NDPS Network Administrator	Use <b>hpmcpdp?.inf</b> file to map or install the UPD driver to the server	<ul style="list-style-type: none"> <li>Uses the same workflow process as product-specific drivers</li> <li>Single driver on the server</li> </ul>	<ul style="list-style-type: none"> <li>Traditional mode only</li> <li>No bi-directional communication possible to get device-specific configuration</li> </ul>	<a href="#">HP UPD System Admin. Guide</a>

\* The complete name of the white paper is **HP Printers Supported in Citrix Presentation Server Environments**.

# Client solutions

**Table 19** Client solutions

No.	Possible solutions	Details	Pros	Cons	More info.
1	No change in workflow – Point and Print	<ul style="list-style-type: none"> <li>• Clients can use existing architecture as UPD supports the Point and Print model</li> <li>• No disruption to client printing environment</li> </ul>	<ul style="list-style-type: none"> <li>• This solution requires no training</li> <li>• Centralized print queue management</li> <li>• Automatic print driver distribution</li> <li>• User search capabilities can be managed by MPA or AD templates</li> </ul>	<ul style="list-style-type: none"> <li>• Server hardware required</li> <li>• Color access control settings in the MPA or AD templates are not transferred to the client</li> </ul>	<a href="#">HP UPD AD Admin. Template</a>
2	Install UPD locally in dynamic mode	<ul style="list-style-type: none"> <li>• Enables the user to search for networked printers using IP address, browsing, or printer lists</li> <li>• Install UPD on client. For example, use software distribution tools such as MS SMS, Tivoli, custom installers, or a server using login scripts or batch files. The script example of <b>install/ q/h/dst/dm</b> has these attributes: <b>/q</b> Quiet mode, no prompts; <b>/h</b> Hides the install dialog; <b>/dst</b> Disables the Services Tab in the HP UPD; <b>/dm</b> Installs the printer in Dynamic Mode</li> </ul>	<ul style="list-style-type: none"> <li>• Can create a permanent instance by adding printer to Printer/Faxes folder</li> <li>• User search capabilities can be managed by MPA or AD templates</li> </ul>	<ul style="list-style-type: none"> <li>• When creating a permanent instance, the user needs to have local administrative rights</li> <li>• Jobs must be cancelled at the device or on the client</li> </ul>	<a href="#">HP UPD AD Admin. Template</a>
3	Install UPD locally in traditional mode  <b>Note</b> If you plan on managing UPD, you must use the <b>install.exe</b> method.	<p>Install UPD on client. For example, use software distribution tools such as MS SMS, Tivoli, custom installers, or a server using login scripts or batch files. Create a static printer on the client using the following script: <b>install /sm&lt;port or printer IP address&gt; /n"printer name"</b></p> <p>Alternatively, choosing the UPD driver when creating a printer via Add Printer Wizard is an option.</p> <p><b>Note</b> When installing UPD in traditional mode, a printer must be created.</p>	Static queue	<ul style="list-style-type: none"> <li>• Driver deployment and maintenance require scripting</li> <li>• Policy management will be disabled when the UPD is installed via Add Printer Wizard</li> </ul>	<a href="#">HP UPD System Admin. Guide</a>

**Table 19** Client solutions

No.	Possible solutions	Details	Pros	Cons	More info.
4	Pre-configure the UPD	<ul style="list-style-type: none"> <li>Use the HP Driver Pre-configuration Utility to pre-configure the UPD.</li> <li>Then, install UPD on client. For example, use software distribution tools such as MS SMS, Tivoli, custom installers, or a server using login scripts or batch files. Script example: <b>install/q/h/dst/dm</b> is explained as <b>/q</b> Quiet mode, no prompts; <b>/h</b> Hides the install dialog; <b>/dst</b> Disables the Services Tab in the HP UPD; <b>/dm</b> Installs the printer in Dynamic Mode.</li> </ul>	These settings can be pre-configured and, in some cases, locked: Duplex, Orientation, Grayscale, Print Quality, Paper Size, Media Type. Advanced features can also be pre-configured, such as Scale to Fit or Watermarks, and Status Notification Prompts (SNP)	Microsoft WHQL certification breaks because the configuration file is modified	<a href="#">HP Driver Pre-configuration Utility</a>
5	Print to network-connected printers	Install UPD locally (with MPLs) or connect to shared queues on servers	Centralized queue and drive management		* <a href="#">Citrix Server white paper</a>
6	Manage users when printing to printshares through managed printer lists (MPL)	Users printing through printshares, mapped within MPL, can be managed via MPA or AD templates	Policies such as Color Access Control or duplex are applied to the client		<a href="#">HP UPD System Admin. Guide</a>
7	Migrate existing client printers to UPD	<ul style="list-style-type: none"> <li>Installer with PQ Migrate can be used for the same driver name for specific printers, not PDL types, such as PCL 6. For example, <b>install/pqmigrate "HP LaserJet 9050 Series PCL 5"</b> This switch will tell the server to install the UPD and migrate every printer queue on the server using the specific driver listed in quotation marks.</li> <li>To use MPA or AD templates, use <b>install.exe</b> as the install method.</li> </ul>	Printer queues, names, shares, and printers are retained	In most cases, the print queue settings and properties will be reset to the default after using the PQ Migrate option	<a href="#">HP UPD System Admin. Guide</a>

\* The complete name of the white paper is **HP Printers Supported in Citrix Presentation Server Environments**.

# Glossary

**Active Directory (AD):** An advanced, hierarchical directory service that comes with Microsoft Windows servers (version 2000 or later). It is LDAP-compliant and built on the domain naming system (DNS) used on the Internet. Workgroups are given domain names, exactly like Web sites, and any LDAP-compliant client – such as Windows, Mac, or Unix – can gain access.

**Active Directory (AD) Templates:** Templates designed by Microsoft that provide a structure for an installation environment.

**Adobe PostScript:** Developed by Adobe, this is the standard page description language (PDL) for the graphics arts industry and commercial printing. Many printing devices support PostScript with a built-in PostScript interpreter.

**Citrix:** Founded in 1989, Citrix is known for the Citrix Presentation Server, which uses the ICA protocol to turn the client machine into a terminal and controls the input/output between the client and server.

**Color Access Control:** Settings to determine which users and/or applications are allowed to print in color.

**Domain Naming System (DNS):** Converts host names and domain names into IP addresses on the Internet or on local networks that use the TCP/IP protocol.

**Dynamic Mode:** This HP UPD feature allows you to find a printer on a network, which is ideal for a traveling user or for printing to a new printer in the office. The four methods for finding a printer in dynamic mode are: Manually Enter Printer Address, Recently Used Printers, Managed Printer Lists (MPLs), and Search Options.

**Embedded Web Server (EWS):** The EWS resides on a hardware device (such as a printer) or in the firmware, rather than as software that is loaded on a network server. The EWS allows you to review, configure, and change settings on a printing device after inputting an IP address into a Web browser from your computer.

**Host-based device:** A printing device that relies entirely on the host computer to perform all printer processing.

**HP Web Jetadmin:** Web-based fleet management software tool for remote installation, configuration, problem resolution, proactive management, and reporting.

**Independent Computing Architecture (ICA) protocol:** This is the core of the Citrix Presentation Server product line. ICA enables a Windows or Unix server to run an application for multiple users simultaneously, while sending only the changes in the user interface to the client machine.

**IP multicast:** A one-to-many transmission of data over an IP network.

**Managed Print Administration (MPA):** Software to create a method to create a controlled and customized print environment using an HP UPD. The key components of the HP MPA software are Managed Print Policies (MPPs), Managed Printer Lists (MPLs), and User Groups.

**Managed Printer List (MPL):** An XML document that provides the information required for a print job to use a printing device.

**Managed Print Policy (MPP):** An XML document that controls the driver operation mode in a particular printing environment.

**Multicast DNS (mDNS):** Also known as Bonjour or Rendezvous, mDNS uses IP multicast with DNS to provide the capabilities of a DNS server for service discovery in a small network that does not have a DNS server.

**Microsoft Windows Terminal Services:** Terminal Services within Windows provides the timeshared, multi-user capability managed by the ICA protocol.

**Microsoft Windows 2003 Terminal Server:** Terminal Server is built into all Windows 2003 servers. It allows users to log in remotely from various types of workstations and thin clients. By logging in, users create their own client sessions on the server.

**Novell iPrint:** Printing solution for global access to printers, customizable views of any print environment, flexible print deployment configurations, and secure printing.

**Novell Distributed Print Services (NDPS):** A printing protocol co-developed by Novell, Xerox, and HP that provides print services on NetWare file servers. NDPS supports bi-directional capability.

**Page Description Language (PDL):** A high-level language for commanding a printer to print text and graphics. Primary languages are Adobe PostScript and HP PCL.

**Postscript emulation:** This is the HP interpreter of Adobe PostScript.

**Printer Control Language (PCL):** Also known as PCL, this is the HP page description language. The PCL drivers (PCL 5 and PCL 6) streamline fonts and graphics to reduce information that is sent to the printer.

**Product-specific driver:** Also known as native, discrete, or standard device driver. This is the PS or PCL driver for a printing device, such as an HP Color LaserJet CM4730mfp.

**Simple Network Management Protocol (SNMP):** This is a network monitoring and control protocol.

**Subnet:** A logical division of a local area network, which is created to improve performance and provide security. A subnet limits the number of nodes that compete for bandwidth.

**Tivoli:** A comprehensive suite of applications from IBM subsidiary Tivoli Systems, Inc., that provides enterprise-wide network and systems management across all platforms from IBM mainframes to desktop PCs.

**Traditional Mode:** The HP UPD functions like a product-specific driver in this mode.

**Universal Print Driver (UPD):** Also known as **HP UPD** or **UPD**, this HP print driver has a common interface for numerous HP printing devices. The HP UPD provides access to a wide spectrum of print features.

**Windows Hardware Quality Labs (WHQL):** This Microsoft facility provides testing services for hardware and drivers for operating-system compliance.

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