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## A METHOD TO PRINT ON THE BEST PRINTER

HP INC

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## A method to print on the best printer

### Abstract

Modern Printers provide myriad finishing options such as duplex, punch and staple etc. for a printed document. Typically, the printer driver residing on the print client provides convenience for the user to provide only the IP address/hostname of a printer to connect to it. This convenience comes with challenges such as when a user intends to print duplex but has an installed printer that doesn't support automatic duplex mode. This might force user to manually re-enter the page printed on one-side to the printer's input tray to get the other side printed as well. At the same time, the printer might have other neighboring printers which support automatic duplex printing without needing manual user-intervention but there is no convenient way for user to make use of them.

This paper proposes a solution to the problem by enabling Printer to Printer communication using Wi-Fi.

### Problem Statement

In a typical enterprise environment, there could be multiple printers available. A print client device might see a plethora of Printers' Wi-Fi SSIDs such as shown in [Figure1](#) below.

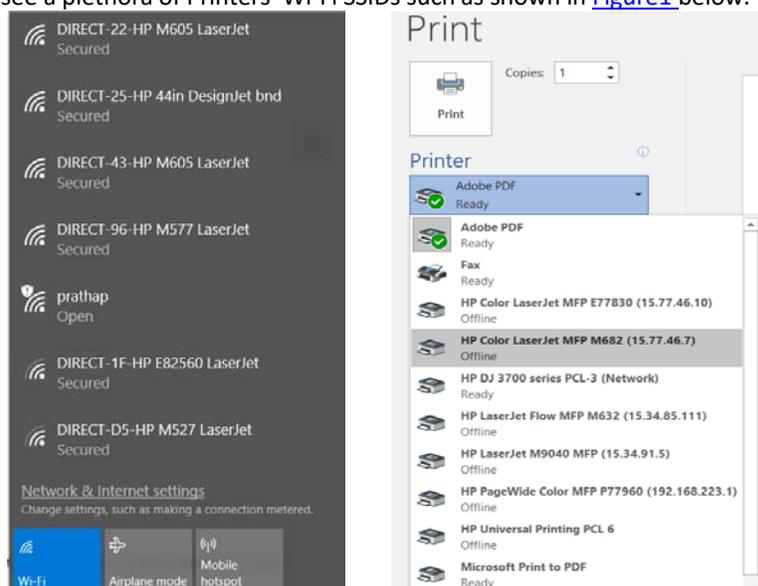


Figure 1: Wi-Fi Direct SSIDs of Printers as seen on Wi-Fi clients (left); Installed Printers on a print client (right)

However, beyond the fact that their names suggest that they might be of Laser or Design segment focused, it's difficult for the end-user to deduce whether a given printer supports duplex printing, punch, staple etc. till he connects to the printer and installs the print driver for it. The problem doesn't end here. As the above Figure(right) shows, a print client might have multiple printers installed. But beyond indicating that these printers might support color or mono, it's still not clear to the end-user whether the printer supports duplex printing, punch, staple etc. till he chooses the printer for actual printing. It would be better to have the user connect to one of the several accessible or installed printers and if the chosen printer doesn't meet the user requirements, it will guide user to the best printer in the vicinity.

### Proposed Solution

#### Optimal Printing via Printer-Printer Communication

Modern printers provide support for Wi-Fi Direct functionality which enables them to connect wirelessly as Wi-Fi clients to a secure Wi-Fi network and simultaneously enable them to create an Access-Point (AP) network of their own, where guest users can connect. The following steps summarize the whole workflow of the solution: -

1. User selects a print metadata option (such as auto-duplex etc.) which is not supported by the user-selected printer.
2. The chosen printer (henceforth called as source printer) scans for Wi-Fi SSIDs of neighboring printers

and zeroes in on those which matches the metadata options which the user wants. The source printer might parse the Vendor-Specific IEs transmitted by these Printer SSIDs to determine the ones which provide a better printing experience than itself.

3. These zeroed-in SSIDs are displayed on printer control panel/client device's notification window with an additional detail called as Location, which might be latitude/longitude co-ordinates.
4. If the user chooses to select one of the displayed printer SSIDs, a random password is generated by the printer firmware and is uniquely associated with the specific print job. It is displayed on the control panel/client device's notification window for the user to note it down.
5. The source printer maintains a table of print job name, print job itself, user-chosen destination printer SSID and the random password. It sends the print job name and the random password to the destination printer where these details are saved as a stored job skeletal.
6. The user can browse through the stored job folder named as source printer's name, on the destination printer's control panel to select the file for printing. On doing so, a message is displayed on the control panel for user to enter the password associated with the chosen file.
7. On successful entry of password (successful match of passwords – first one sent by source printer in Step 5 with the one entered by the walkup user in Step 6), the destination printer would change the password of its Wi-Fi AP-mode to the matched password.
8. A Wi-Fi beacon frame with an additional Vendor-Specific IE indicating the print job name is transmitted by the destination printer.
9. The source printer would receive this beacon and compare the print job name from the beacon with the table maintained by itself as explained in Step 5. If the print job name and the destination printer SSID match with the entries maintained by source printer in its table, it would send a probe request to connect to destination printer's SSID using the password generated in step 5 above.
10. The standard Wi-Fi probe response from the destination printer followed by authentication and association would follow, post-which the source printer would be connected as a Wi-Fi client to the destination printer's AP interface. The print job would be then transferred over secure Wi-Fi from source printer to destination printer where it would be printed with the metadata properties which the user wanted. The below [diagram](#) represents the whole flow described above.



Figure 2: High-Level View of Printer-Printer Communication

The below flowchart explains the sequence of operations on the source printer side: -

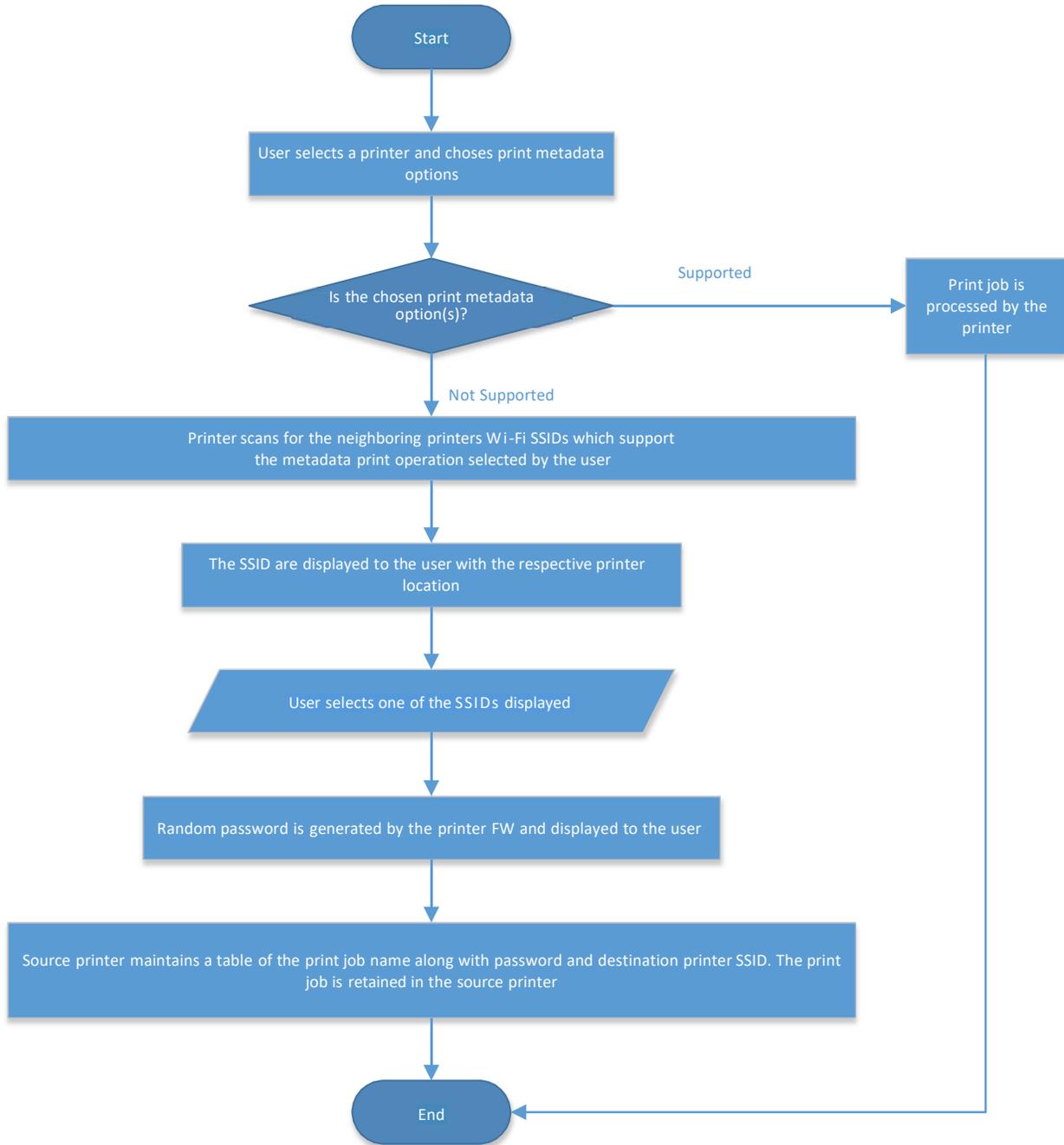


Figure 3: Operation Flow-Chart on the Source Printer

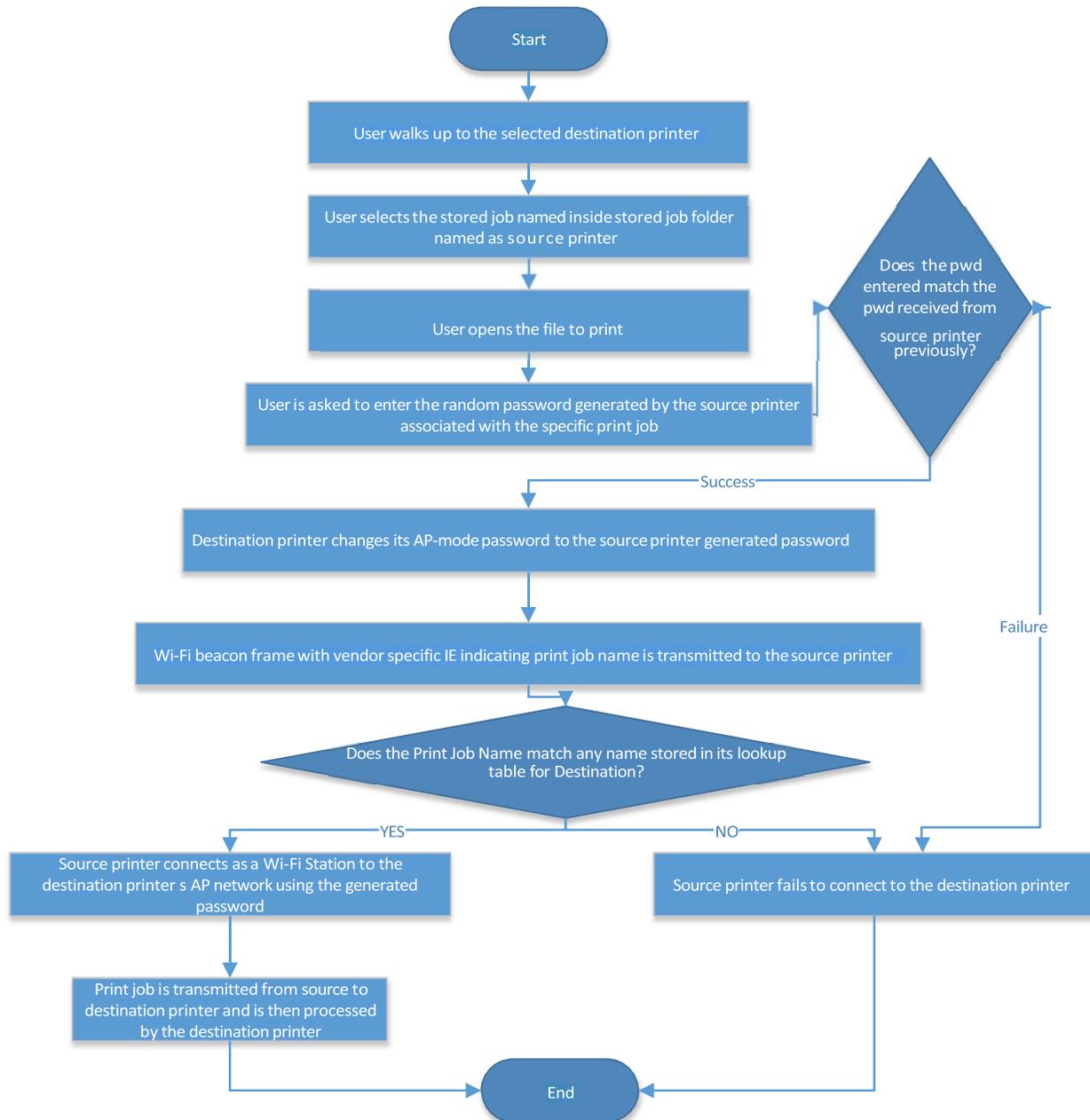


Figure 4: Operation Flow-Chart on Destination Printer

### Advantages

1. The proposed method helps the user to access the most optimal printer without the necessity of connecting to every printer to determine the most optimal one.
2. The idea can be extended to scenarios where if the user's initially chosen printer has supplies running low (such as no staple pins etc.), it will help guide user to an optimal printer with better supplies.

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