WHITE PAPER

Mobile Cloud Printing Strategy

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Mobile Printing Strategy

Introduction

Over the past few years, there has been a proliferation of mobile handsets and tablets. Statistics indicate that this growth is eroding the traditional laptop market, and may be the preferred platform of choice for application and content access. Most Mobile Operating Systems (MOSs) that these tablets and smartphones are based on have not implemented a print path that the users of laptops and PCs are used to. This does not mean that there is no inherent demand for it, but an opportunity. A recent survey conducted by HP brought out a few key points:

- There is a one billion strong mobile work force and nearly 85% of them wish to print without using PCs
- Mobile devices such as smartphones are going to drive 12 billion incremental pages by 2012
- By 2020, nearly 33% of all digital information is expected to live or pass through the cloud

It is imperative that the ecosystem players – Mobile/Tablet vendors, MOS suppliers, Telcos, Application and Content developers, Printer OEMs, Print Service Providers and Managed Print Service Providers have a mobile print strategy to participate and profit from this new and emerging market.

Key Elements of a Mobile Print Strategy

The Offering

Applications on MOS platforms have provided users unrivaled access to content on the go, but stopped short of providing a print path. Providing these users of smartphones and tablets the ability to directly access MFP capabilities in a manner similar to that offered by drivers on PCs and laptops (but without the need of PCs or Macs as intermediaries) is the main value proposition. Similar to the trend of applications and content moving to the cloud, device based printing is moving to a cloud-based mobile printing model. Various OEMs and other cloud players such as Google have been talking about mobile cloud printing, but are at various stages of readiness. This paper expands on some of the areas to be considered when formulating a mobile cloud printing strategy.

Diversity of Mobile Devices to be supported

Apple's iOS, RIM's Blackberry OS, Google's Android, are the key MOSs in this market segment. Nokia's Symbian though dominant in Europe and Asia, is ageing and being replaced by MeeGo. Samsung's BADA, and Microsoft's Windows 7 are emerging contenders. The advantages that Android and Windows 7 have are that multiple hardware vendors such as HTC, Motorola, Samsung, Dell, HP, etc, have brought out numerous smartphone and tablet models based on these MOS platforms. This multitude of MOS platforms comes with various versions, screen sizes, usability differences, language variants, etc. Providing a consistent branded offering across the range of platforms is key, but keeping pace with the MOS roadmaps and releases is a nightmare to support in a continuous manner - a significant development challenge and can prove costly, if done in-house. Partnering with players who have the focus, the expertise and the ability to support these offerings as part of your mobile cloud printing strategy would be an attractive alternative.

Target Markets for Printer OEMs

The breadth of markets that can be addressed by a mobile cloud printing offering is vast and, it is key to

have a synergistic approach to evaluate how these can be offered using common platforms and infrastructure where possible to gain operational and economic advantages. The key market segments are:

Consumer segment

- Individual users who are on the move and need convenience printing at home or guest printing services in public locations.
- Content and application accesses are typically for entertainment, social networking, personal productivity and communication – e.g., Photographs, IMAP/POP3 email, Maps, Browser, etc.
- Target printers/AIOs to be supported are predominantly low cost inkjet devices that tend to have proprietary PDLs.
- Given that this is a general consumer, it can be served off a public shared cloud infrastructure.

SMB users

- Employees of small and medium businesses typically would need support for personal productivity/communication and line of business applications.
- Being cost conscious, a managed service with a virtual private cloud, or authentication and security levels that are higher than that needed by the consumer segment will be required. This could be potentially offered by dealers who do provide managed print services as an additional service.
- Printers/MFPs used by this community typically support standard PDLs such as PS, PCL5/6.

Corporate/Enterprise

- The CIOs of large enterprises are particular about security and control of applications/data and devices used by their users. Private deployments within the enterprise behind firewalls are often preferred. Private cloud services dedicated to large enterprises could be offered as part of the managed print services.
- Besides data and network security of encryption, VPN access, authentication, are key requirements.
- Control over who has access to what service is another key requirement. Mobile cloud print services can be complementary to other mobile device/application management systems offered by companies such as Good, SAP/Sybase, RIM, etc.
- Specialty printers used in applications such as logistics, transportation, healthcare, government, etc. often need to be integrated into the offering.

Guest Printing Services

- Hotels, Business Centers, Airport lounges, etc. offer Wifi connectivity, PC/Web access and printing/scan/fax/copy services. Road warriors with smartphones or tablets with Wifi access can discover printers and print directly as opposed to going through PCs/Macs.

Print Service Providers

- Similar to Web2Print, users could leverage the print app on smartphones/tablets to print to "print service provider" and activate the authentication, workflow, print/delivery/payment options.

Smartphones/Tablet companies

- As vendors such as Apple bundle in AirPrint with their devices, Google has their cloud print offering for Chrome based devices, this will be another competitive space. Compulsions to bundle in this capability with the device will arise, and opportunities of co-branding are possible.

Telcos

- As competition is increasing amongst Telcos, branded handset offerings with their app stores, email services and other value added services are some areas that can provide differentiation. Mobile cloud printing can be incorporated in this service delivery platform as a horizontal capability across the whole suite of services. Opportunities for co-branding and managed service offering partnerships are possible.

Elements of Mobile Cloud Printing Offering

Smartphone/Tablet

The generic workflow – user accesses content, has a desire to print it, chooses a target print device, and provides print options with an intermediate stage of preview of the content (WYSIWYG) to be printed.

The next few points address the intricacies and options to achieve this workflow in the most intuitive manner for a user. It is essential while evaluating options, to choose the right architecture that can be flexible, scalable, adaptable to address the different use cases across markets with the right approach, and not be tied down to multiple silo'ed point offerings that are not synergistic.

Print Approaches

There are three main approaches to printing from these devices:

Self contained Print Application

- The all in one approach of a print application, offering cloned access to content – be it email, web, photographs, etc. and providing the print path.
- The functionality of email clients, browsers, etc. have to be recreated by the print application provider and often compete with native applications or applications that are bundled free with the mobile device and preferred by the users. Print enablement of applications is restricted to those offered by the print application providers.
- This approach was initially the only option given the sandboxed approach of applications and the inability to share content across applications in a MOS. Since then, MOS platforms have seen the need for controlled access to content between applications and this opened up alternative approaches to printing.

In-App printing

- With the content sharing capability being offered, users have the familiarity of accessing applications and content from native applications – either provided by the device vendor or third party developers. The functionality of printing is offered as a horizontal capability across all relevant applications and the print command is invoked from within the native application.
- The advantages of this approach is that the print application developer needs to focus on supporting more content formats, print/scan/fax functionality and ease of use as opposed to spending time re-inventing the wheel of functionality provided by other applications. This approach becomes preferable for CIOs as well as users as they can take advantage of features and enhancements of current and future applications as opposed to being dependent on the print application vendor. Applications be it for personal productivity, entertainment, social networking, or enterprise line of business applications such provided from Microsoft, SAP, Salesforce.com, Oracle, etc. can be print enabled.

Email attachments

- The third approach needs no application on the mobile device, and users email content to be

printed as attachments to the cloud or a device to be printed. The target device for printing is either a unique email address of a printer, or a code sent back to be entered on applications running on the front panel of the target device (pull print). The limitation of this approach is that the content is limited to what can be sent as an attachment, and in the case of pull print, to a limited number of print devices that are supported.

Print Accuracy and Quality

There are many mobile print solutions in the market today, and one key differentiator is the print accuracy and quality. Print ready content – images and PDF files are printed relatively easily, but other formats such as office documents and proprietary formats suffer. Examples of some of these issues include: Excel spreadsheets lose formatting, 3D charts and graphics get flattened to 2D, fonts get replaced, data goes missing. Content transformation is one key element to retain accuracy and quality of the original document.

Content Transformation

If the content to be printed is not compatible to what printers accept, it is necessary to transform it into a print ready format. There are multiple options available:

- In-Device formatting
  - Equivalent of the "quick view" or viewers available on devices to preview the content – often as an image, which is used to print. The print accuracy and quality is as good or as bad as the viewer output, irrespective of the quality of the printer. This leads to users blaming the printer for undesired output results, whereas the fault lies in the print application's rendering of the original document.
- Cloud Transformation
  - There are two main approaches to this
    - All the printers drivers in the cloud approach – essentially mimic the PC loaded with the drivers and based on the target printer device, an appropriate driver is selected and the output is sent to the printer either directly or through the mobile device. The cons of this approach is the accuracy of selection of the right printer driver amongst thousands of options, and the large size of the PDL output that needs to be sent from the cloud to the device.
    - Hybrid approach of transforming proprietary content formats into an industry standard print ready format (that is not a large file), which is sent to the mobile device, from where the PDL specific to the target device is sent.
    - The advantages of the cloud approach is the dynamic ability to add support for new and emerging formats of content across different verticals – e.g., graphic arts, architecture and construction, etc., to add to the capability of the offering. With the processing power in the cloud, the print outputs can be accurate and of the desired quality to show the OEM's printers' features in the best light.
- In-Printer
  - In some cases, the content format may be compatible to what a printer can receive and hence the content is sent directly to the printer for it to print. These are typically higher-end expensive printers and restricted to a limited set of file formats.

Target Printer Identification

This area is dependent on the capabilities of MOS systems and printer/MFP devices. Here are some options:

- Target printer in within the vicinity of the mobile user:
  - Dynamic printer discovery of printers/MFPs
    - Via network protocols such as Bluetooth or Wifi.
    - Various protocols such as Bonjour, uPnP, SNMP are supported by OEMs for printer discovery.
    - Over Wifi, the printers can either be connected to a LAN or accessed through a Wifi access point, or directly if it is a Wifi enabled printer/AIO.
    - Options to detect or filter results that are restricted to the OEM's brand are possible.
    - With integration with corporate networks and authentication, network printers in a location can be presented.
    - Integration with geo-location capability of mobile devices is possible – typically to detect service provider locations.
  - Walk up printing /Pull Print
    - Based on proximity and identification, a user walks up to the target print device and enters a PIN that is sent to the cloud where the job submitted (without a target identified) is held and based on authentication, the job is sent to the printer to be printed.
  - Direct physical connectivity of the printer to the mobile device
  - Manual IP entry
    - A few MOS systems do not have multicast capability to discover printers on the network, and hence need a manual entry of IP address of the target printer.
- Target printer/device is not in the vicinity of the user – Remote
  - Email address/IP address of printer
    - New classes of printers come with unique IP address/email that could be used as a means of sending content to them as an email attachment. Pre-requisites for this approach would mean spam filter support in the cloud, storage/ forwarding/routing based on the device being on or turned off.
    - Current solutions have a PC acting as a proxy to the printer/MFP and offer an email address to identify the target device.
  - Cloud Aware printers
    - Vendors such as Google are trying to create new standards to embed within new printers to enable targeting across the Internet.
  - Virtual
    - In the case of jobs submitted to print service providers, the target device is not identified, but left to the internal workflow and rules of a PSP. They could adopt a hub and spoke model to direct the print to a central location or a location where the user is picking up the job.
    - Similarly, when mobile cloud printing is integrated with job management systems as part of Managed Print Services, internal rules determine where and how it is printed.

Usability

The important aspect of the whole workflow across use cases and markets is to keep the user in mind. It has to be intuitive and user-friendly across different mobile platforms keeping in mind how each MOS has a unique approach to this aspect. Apple iPad users have a different set of expectations as opposed to RIM users, but the underlying theme of accessing content, identifying a target device to print should be a non-geeky experience. Complexities such as PDLs supported should not be exposed to a user. The speed and turnaround of a job submitted to the

collection of the printout should match or exceed that of an experience from a PC/printer driver, while delivering the accuracy and quality from a PC/Mac. Users should be able to take advantage of the mobility of the platform without sacrificing any functionality or performance.

Cloud Elements

Besides, the content transformation in the cloud that was discussed earlier, there are other key areas or extensions that could make it a strategic managed service.

Content/Applications

With the launch of apps stores, HP has led the way with HP marketsplash and third party content partners in the cloud to drive more printing on demand. Applications that run on new smart front panels (refer to Thinxtream's white paper on smart front panels) or on mobile devices access the content in the cloud. While these are mostly consumer based, the model is similar to the enterprise Web services/Java based applications that can be accessed from front panels. Proprietary offerings from different OEMs – EIP from Xerox, MEAP from Canon, Chai/OXP from HP, Lexmark's eSF, Ricoh's ESA, etc. have been trying to rope in application developers to port apps to their platform. It is to be seen if the application developer community will embrace porting of their applications across these proprietary platforms, or move towards "defacto" standards such as Android.

Content Transmission/Storage Security

Depending on the use cases described above, there may be a need for the content transferred and/or transformed through the cloud, to be transient, temporary or persistently stored in the cloud. The transmission paths need to be secure and encrypted, and if stored, be secure. In some cases, depending on the security requirements, VPNs and location of the cloud infrastructure become important considerations.

Deployment Options

Depending on the target market segment, there will be a need to support multiple deployment options – public cloud, virtual private cloud, private cloud or server deployment within the enterprise. The flexibility to offer these based on need has to be supported by the mobile cloud printing architecture. These cloud services could either be managed by a third party, or by the OEM or by end customers.

Integration with MPS offerings

Most MPS offerings across stages 1, 2 & 3 (as defined by Photizo's MPS model), are moving to the cloud and mobile cloud printing is another form of printing similar to printing from PCs. Integration of job management, metering/cross charge, ordering supplies, etc. will become par for the course eventually. Large OEMs such as Xerox and HP are already offering these as part of their MPS frameworks. The key is to have the ability to support diversity of demands of support for smartphones/tablets as they penetrate the corporate environment, and the ability to provide a print path to legacy and current multi-vendor MFP environment rather than be stuck with a silo'ed approach of supporting a select set of OEM's printer fleet. The other challenge is the need to increase demand to support a larger portfolio of applications – either in-house developed or from third parties across different MOS platforms.

Business Models

The advantage of a cloud based mobile printing architecture is that metrics of the print path can be captured and integrated with the business model. Depending on the market and use-case, offerings

could be based on licenses, transactions, ad supported, or the managed print services business model. The consumer market is increasingly looking at mobile printing apps to be similar to printer drivers and, is un-willing to pay money for it. The justification therefore should be based on additional pages of print that this model will drive (a share of the 12 billion additional pages by 2012) with ROI coming from profits of additional toner revenue. SMB, Guest printing, Enterprise/ Government/Public Sector, etc., are markets that need additional features and services, where revenue and models could be integrated with managed print services or transaction/license models. OEMs will have to look at costs of development of these offering, and create appropriate ROI models that blend with the overall strategy

Summary - In-House or Partner?

The mobile cloud printing marketspace is nascent but an emerging market that has huge growth potential. While printing from smartphones were considered as good to have, printing from tablets (increasingly becoming a replacement to notebooks) is becoming a must have. Printer OEMs need to rapidly consider the various factors mentioned above as they define their strategy. To implement this strategy will mean putting in place a large team that have skill sets across different MOS, Mobile Apps, Cloud services, etc. This translates to a fairly large allocation of engineering budget that is often committed to current products and services. Companies such as Thinxtream Technologies, offer an attractive alternate to the internal approach and though a strategic partnership, can help realize Printer OEMs' unique vision of mobile cloud printing strategy that is integrated with their existing products and services.

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