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Print, Digital Send and Authentication using screencast

Abstract:

In the fast pace of technological innovation, Printer is an endlessly evolving product which is experiencing new innovations and will keep continue to experience in the future. With consumers are becoming more aware of new technology, the need of new and smarter ways of Printing, Digital Send and Authentication using new technology will probably be one of the mainstays for innovation in the world of printers. For printing sectors innovative printing and Digital Send is to stay productive and competitive whereas innovative security authentication is a must to protect the data from unauthorized access. New ways of Printing, Digital Send and Authentication should focus helping consumer work faster, smarter, more flexibly and more importantly securely and all achieving these while saving its valuable time and money.

This idea focuses on providing a new and innovative method of Printing, Digital Send services and Authentication to customer using screen casting technology. Screen cast has been a known and widely accepted technology for wireless connections from devices (phone, laptop etc.) to monitors, TV's screens. The idea is to use printer's Front Panel as a cast device and seamlessly use print, authentication and digital send features from mobile devices.

Problem Statement:

Print and Digital Send Service:

One of the most common way of printing is by using a Printer Driver and many a times using a universal print driver. Though Printer driver provides many a functionality, it comes with lot of issues. With so many printer models available, consumers prefer using a UPD rather. The downside to the universal printer driver for say, is that many of the printer's important features will not be available for use. For say, if the printer has the capability of Digital Send and faxing, those functions may not be accessible to any network computer that is using a universal printer driver but accessible instead by using the driver designed for that specific model. In many cases, with compatibility issues, the printer manufacturers provide a universal driver and have a separate drivers for Digital Send and faxing. Even just printing sometimes can cause issues with print drivers. The printers sometimes produce odd characters in response to formatting which is not translated well by driver from the application program used for printing. Connection established between driver and printer to get the printer information eats a lot of time. With any issue on printer, it's a troublesome on the driver side. Many such issues are known with printing using driver. Again, with newer OS and newer features are getting added, printer driver must be updated every now and then to make it work properly.

To have a driver less printing is more flexible for consumers. Driver less printing has its own problems too. Few are listed below:

ePrint:

1. Printer needs to be registered and connected to Cloud solution all the time which all the customers may not want.
2. User email address must be white listed in the Cloud to allow email-based printing.
3. WPP (Web Print Platform) ePrint does not support all the document format.
4. No option to provide Job settings like copies, color, etc. are available
5. Printer will not get to know which user has sent the job.

Air Print:

1. It has most of the Print, Scan and Fax functionality but works only with Apple devices.
2. Does not provide a better way to authenticate the user.
3. Prints documents which are only supported by Apple else required installation of third party application.

While there are many methods available of having a driver less printing, using newer technology which will provide more flexible and smarter way of printing and Digital Send is an add-on to stay productive and competitive in printing business. Print and Digital Send through screencast, solves many such problems by providing a simple cast to print feature.

Authentication:

Authentication in printer is performed to confirm the identity of the user who wants to access it to perform any job. In addition to providing access security, knowing user's identity allows printer to have the accountability of its usage. Traditionally authentication is done using passwords, PINs, private keys, smartcards etc. These

existing methods require user to enter username and password or pin or to keep a card always. If an alternative way of authentication is available but that isn't easier to use, users have the tendency to shun it. With new technologies are evolving day by day, no user wants to go through the step of typing a username and a lengthy password every time they log in, neither they want to hold a smart card with them always. These days consumers don't get to adopt to security for the sake of security. It's for the manufacturer of the printer to make them adopt to better security by giving them a comparable but simpler, easier and easy-to-use experience. Given the fact that swiping a smartcard or typing a username and password or using a private key takes just a few seconds, providing a simple user experience standpoint is critical for Print Business.

On the other hand, companies have put huge effort in making a cell phone smarter, faster and smaller. An always-carried device like cell phone can create an authentication experience that is significantly easier than the traditional typing in username, password or keeping a smart card. It's noteworthy to mention that a carried device like a phone can never be replicable.

This idea is to provide an easy way of authenticating to printer using a hand held mobile device and also perform Printing and Digital Send Services seamlessly using screen casting.

Solution:

Screen casting has been a well-known and widely used feature which uses screencast protocols (ex: miracast) for wireless connections from devices (phone, laptop etc.) to monitors, TV's screens. It's the wireless media-sharing standard developed by the Wi-Fi Alliance that extends the Wi-Fi Direct networking protocol for media streaming. The connection is created via WPS and therefore is secured with WPA2. IPv4 is used on the Internet layer. On the transport layer, TCP or UDP are used. On the application layer, the stream is initiated and controlled via RTSP, RTP for the data transfer.

Screencast works directly by linking two supported devices, such as a television dongle and an Android device, using a dedicated peer-to-peer Wi-Fi connection (aka Wi-Fi Direct). The devices need to have a recent Wi-Fi radio, plus they need to implement the Miracast protocol in their operating systems.

Printer firmware can easily add screen casting feature by adding screencast protocol. Once screencast support is enabled on the Printer, printer control panel will be broadcasted as a wireless access point for any screen casting supported device to connect to it via screen casting. Printer control panel can then be used substantially for printing, Digital Send and Authentication.

Print and Digital Send Service:

Upon successful screen casting between printer control panel and per say mobile device's screen, any image or any document can be opened in the mobile device and it will be mirrored on the front panel of the printer. On the printer control panel, an option of Print and Digital Send option will be given.

-On selecting Print/Digital send option: On selecting print option on the printer, the Control Panel screen will be captured and stored as jpeg or jpg file and will be send to the print device component as any other normal print job for processing for printing. On selecting Digital Send the Control Panel screen will be captured and stored as jpeg or jpg file and will be send to the digital send component for sending the stored image to a destination path such as to email address or to a network folder or to a SharePoint.

Operating systems of newer-generation provides inbuilt functionalities to capture a screen shot. It uses a graphical interface having capability of saving a bitmap image of the current screen, or the screenshot to their clipboard or to a comparable storage area. For example, in Win CE windows operating system, It provides 'Bitmap' class (part of System.Drawing) of windows lib (System.Drawing.dll), which stores all the pixel data currently displayed on the screen and finally dump these data to a file with jpeg format.

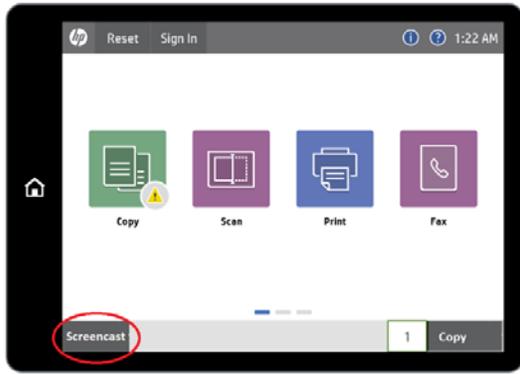
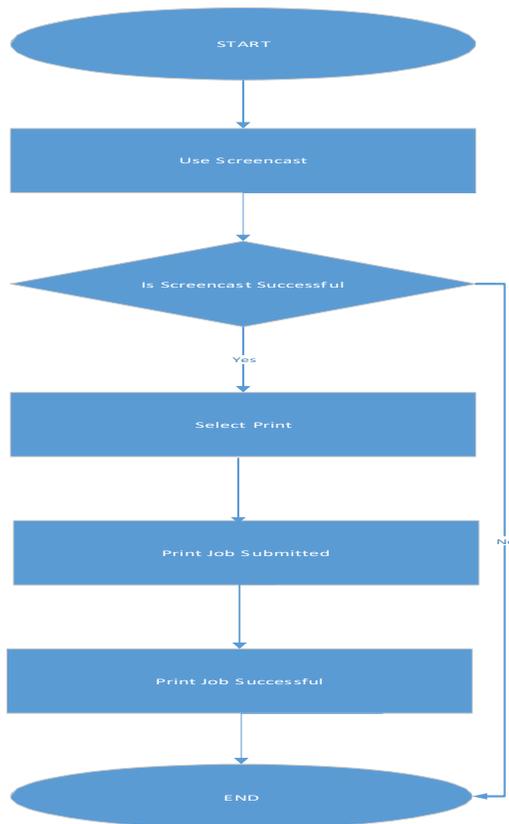


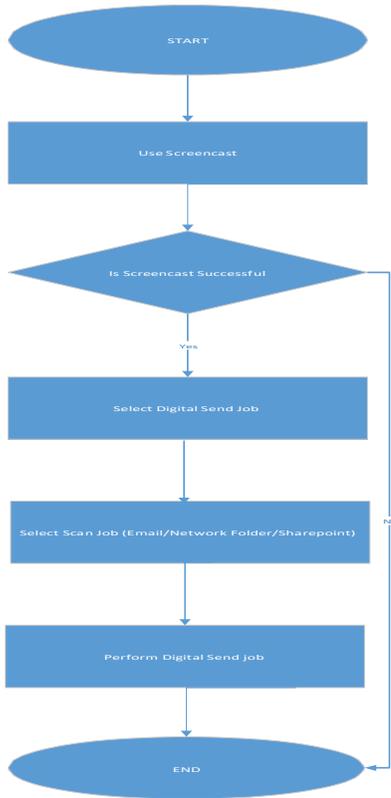
Image 01: Printer Control Panel before selecting Screencast functionality.



Image 02: After successfully screen casted a Mobile Device's Home Screen with Printer Control Panel Print with Cast:



Scan with Cast:



Printer Authentication:

Upon successful screen casting between printer control panel and per say mobile device’s screen, any image or any document can be opened in the mobile device and it will be mirrored on the front panel of the printer. On the printer control panel, an option of Authenticate with screen cast will be given.

As screen itself is casted from mobile to printer, a QR code kind of image can be screen casted from which printer can extract data for authentication using its image decoding capability. User can generate a QR code following a format like below shown which printer can use for authentication.

```

{
  "Sign in With Screencast": {
    "Authentication Method": {
      "Windows": {
        "Domain": "domain.com",
        "Server IP" : "123.123.234.234",
        "Username": "User1",
        "Password": "Password1",
        "UseSecureChannel" : "False",
        "CA Certificate": ""
      }
    }
  }
}
    
```

Image 03

Printer firmware can expect data in the format shown above after decoding the QR code. If the data decoded by printer firmware has any authentication details such as ‘authentication method: “windows”, username: “user1”, password: “Pass1234”, Use SSL/TLS: “false”, “CA of Authentication Server:”, printer can use these data and validate user. Upon successful validation it can allow user as any authorized logged in user to access printer services.

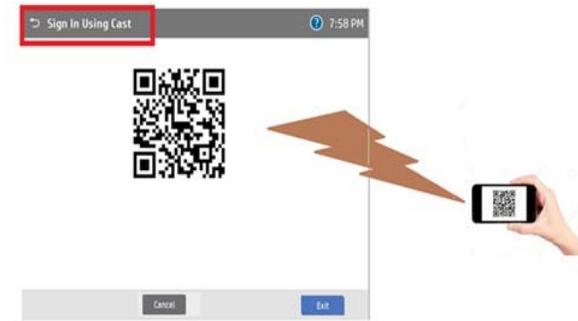
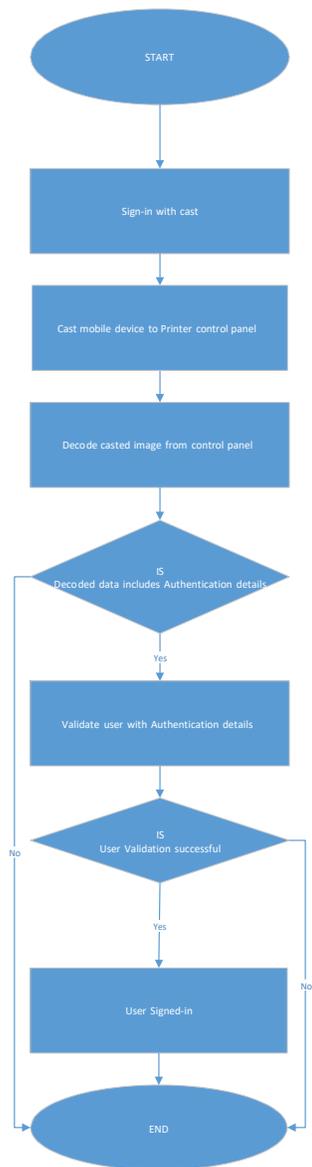


Image 04



Prior Solution: Although screencast is widely accepted protocol, no prior solution takes advantage of printing or Digital Send or Authentication through screencast.

Advantages:

1. Enhanced user experience.
2. No additional driver support needed on either side (client and printer).
3. Independent of document format.
4. No need to carry a smart card or keys or need to type username and password

Disclosed by Gopesh Bhardwaj, Sahu Rajakishore, Pradhan Puranjaya, Sannagonappla Pampanna Mahendra and Asghar Md, HP Inc.