
PRINTING WITH ANDROID USING AD HOC NETWORK ON MARS WIFI APPLICATIONS AND STATIC ROUTING

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Abstract. The world of technology is currently developing very fast along with the times that must reverse the use of hardware and printing machines which are often called printers. Printers are print media Documents Needed for documents and can be shared with many people without the need to share files with other users. If there is data sent via WhatsApp, then use the data then you are long enough, contact the Whatsapp (WA) application then send the file via email, then open the email then send an email to the printer or printer sharing. This makes printing files from WA requires a long step. To be able to print on a printer using WiFi, you need to make sure that there is a Mars Ad-hoc laptop which is connected to a laptop computer network and can share printers with Android-based phones, then routing statistics from Microsoft Windows to network networks with different networks and using printer sharing from Android to print directly from Android with the printer address already in the printerhare application.

Keywords: WiFi, Ad-hoc, Android, PrinterShare, Static Routing.

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1 Introduction

Today's technology is advancing rapidly where previously people printing using typewriters has now switched to computer media for typing and printers as a document printing device from a computer. SNA (social network analysis) is used to define how important the nodes are in networks such as wireless sensor networks (WSN). Optimizing a route is another important feature in wireless sensor networks (Syarif et al., 2017). Computers and printers are tools that today cannot be separated because the results of typing on a computer can be printed just by using the printer. There are several types of printers, among others: printer deskjet, laser jet printer, plotter printer, 3d printer and many more are still being developed.

With the increasing use of WA applications or other social media applications that use the android platform this results in more flexible data exchange with mobile phone data exchange can occur, but if we want to print directly from our smartphones from android this requires a step long enough, the file or data to be printed must be downloaded first and then must be sent via e-mail, after that we look for a computer that is connected to the printer then we open the e-mail and download the file and then print to the printer. This makes the move to print from android to be long, it should be with WiFi Mars application and printer share and static routing Microsoft windows no longer need to do step is enough to open the file from WA, or application in your android then print select printer and print finished. In addition to doc files, ppt, xls jpg photo files, and pdf can also be printed on printer sharing apps and Mars WiFi ad hoc.

Thus printing files on android applications no longer need to perform the steps above is quite direct open file and print. But must be considered WiFi Mars must be active and share the

printer has been set and the configuration of static routing is running. The things to watch out for are ensuring the network cable that the printer is sharing in the state is on, and printer sharing is also in the state of the computer is on, otherwise there is no active firewall which will result in data becomes blocked.

Based on the description above then got the problem formulation that is: How to print documents using android on WiFi media ad hoc Faculty of the Computer Science University of Mercu Buana?

The purpose of the study are :

1. Android can print files or documents, as well as photos with an ad hoc network and WiFi Mars network and printer share.
2. Anyone who has a good WA Lecturer or educational staff can do the printing of documents from anywhere with the condition is still affordable WiFi Ad-hoc.

The benefits of this research to make data in the form of files or documents and photos can be printed directly or in print using the application printershare from android, with Ad-hoc network media.

A. Various forms of computing

The forms of interconnection between devices are of great importance since the current era is already in convergent devices, the following is an example of figure 2 in which the figure shows the linkage of all hardware with an ad hoc network.

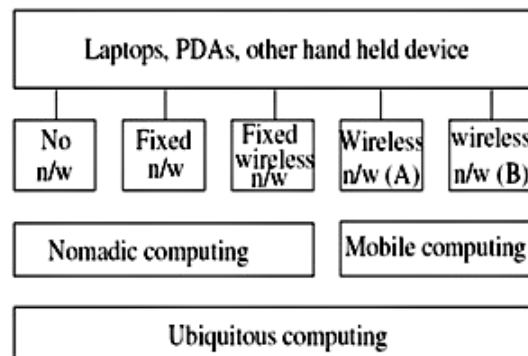


Figure 1: Computer Linkage (Dudhe et al., 2014)

A mobile device can be used anywhere, can be moved, can be used anytime, all the above devices used by researchers to be a reference for those who use portable devices and small-scale wireless communication network (Dudhe et al., 2014). An Ad-hoc network is a collection of mobile nodes equipped with wireless communication adapters, where these nodes dynamically form a temporary network without requiring existing network infrastructure. Ad-hoc routing networks have a considerable challenge because Ad-hoc networks can be built quickly with the following scenarios there are several variations of developed routing algorithms such as AODV, DSR, DSDV, TORA, FSR, LAR, ABR, and more (Dudhe et al., 2014) (see Figure 2.)

An Ad-hoc mobile network (MANET) is a set of wireless mobile nodes that are formed only temporarily and are not permanent because they do not have a definite infrastructure because all nodes are free to move anywhere because each node is configured on the node of each mobile device (Soujanya et al., 2011). As shown in Figure 3 it can be seen that there is a sufficiently high separation distance from the existing radio waves, so that the source node cannot reach the destination node, yet this limitation makes the multi-hop MANET mechanism allow each node to provide its radio range as a transmitter medium in order to the destination node can interconnect information to the destination node (Azizan et al., 2016).

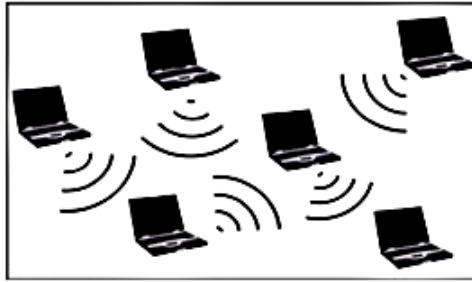


Figure 2: Ad-hoc Network (Soujanya et al., 2011)

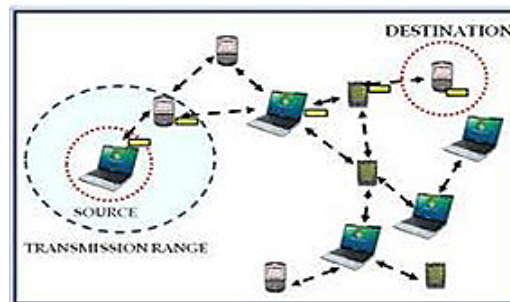


Figure 3: The relay data packets the source node to the destination node (Azizan et al., 2016)

Ad-hoc wireless networks do not require to first build their network infrastructure before using an ad hoc network. An ad hoc network is better built in an area where it has an existing network infrastructure backbone (Ray & Turuk, 2016). Wireless networks not only provide the flexibility of connections among users in different places, the wireless network also helps in expanding the network to any particular building or area without a wired connection. (Raza et al., 2016). Cloud Printer enables applications like (web, mobile, and desktop) and all connected devices to print to a printer connected to the cloud network. Basically Cloud printers are the type of printer share that is tailored to the user's request as well as the availability of data based on shared networks on the cloud network, usually, cloud printers use the Internet network and also some use the intranet network. Cloud Printing is a solution for connecting networked computers to the printer. Cloud Printer allows its users to print jobs by sending a command to the cloud printer (Saraswat, 2014).

B. Network Development Life Cycle (NDLC)

In developing a computer network both at company and academia, a method called Network Development Life Cycle (NDLC) is used. Where this method is a method that depends on the previous development process such as strategic business analysis planning, network design with topology, simulation and prototyping, Implementation, Monitoring network that has been built, then do the management network and monitoring network. (Moedjiono et al., 2017) (see Figure 4).

C. Android

Android is the most popular operating system in the world today, which is used for mobile devices and tablets today. Android is an open source operating system, made by Google, and available to all developers with varying levels of expertise. From the first version (2007) to the latest (2015 - 5.1 Lollipop), the Android operating system comes with many App improvements (Science & Studio, 2016). Android is made in Java language programming. Note, however,

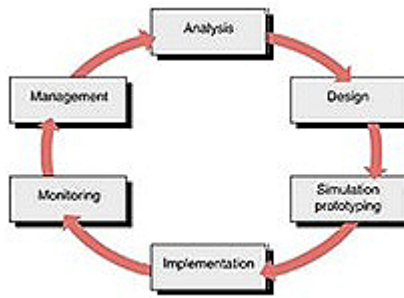


Figure 4: Network Development Life Cycle (NDLC) (Moedjiono et al., 2017)

that java languages are not executed using a standard Java Virtual Machine (JVM). Instead, Google has created a custom Virtual Machine (VM) called Dalvik where Dalvik is responsible for converting and executing Java bytecode (Goggin, 2012). Routing mechanisms on the vehicular network are responsible for maintaining the exchange of information, on the network topology and the condition of each path (link state), between the most mobile nodes, can take place continuously. Such information is necessary to determine the best route and maintain the communication lines formed between a pair of nodes on the network (Aziza et al., 2017). There are three wireless security certificates among others : (Gunther, 2013)

1. Wired Equivalent Privacy Algorithm (WEP)
2. Wi-fi Protected Access (WPA)
3. Wi-fi Protected Access2 (WPA2)

2 Methodology

A. Design

In the design should pay attention to the following things as in figure 5:

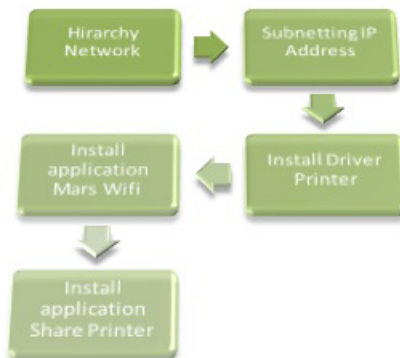


Figure 5: Design Methodology

1. Provide core network information, distribution, and access in a network topology

In this study using core network layer hierarchy is used to perform routing so that different network end devices can communicate with each other, then on the distribution layer there are switches used for intermediary devices where the purpose is to forward the data packets from source to destination, and which the last is the access layer used by the end device to send the data packets to the destination. As for more details can be seen from the picture 6 below.

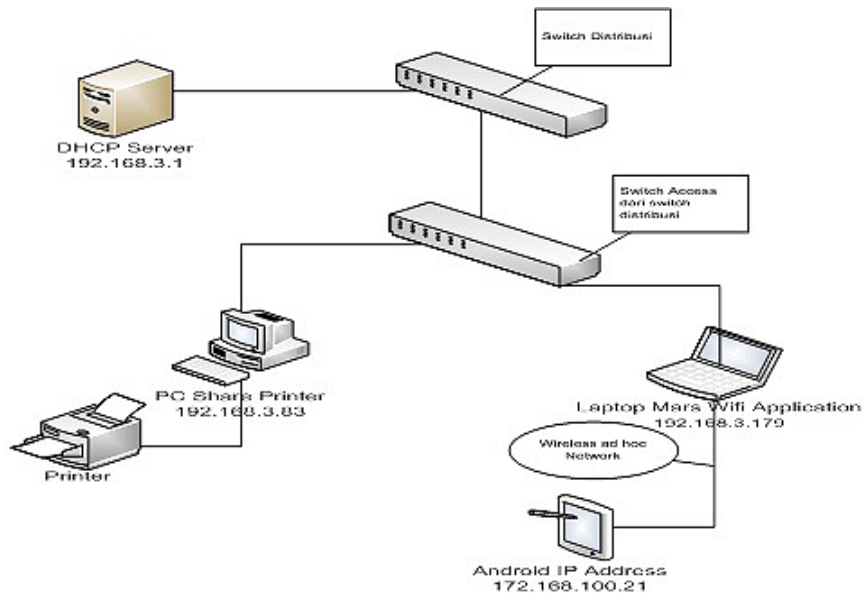


Figure 6: Network Hierarchy sharing printer with android

2. Create subnetting to give ip address to every end user in a network

Subnetting is a rule of giving IP address so that end devices and routers can communicate with each other. There are several methods in subnetting between them is VLSM method, and for this research for subnetting using VLSM method. This VLSM method is a method that sort from the needs of most IP address to the smallest. After that use a subnet table as in table 1 below:

Table 1. Subnetting table

Subnett	Number of Users	Broadcast and Network ID	Total
/30	2	2	4
/29	6	2	8
/28	14	2	16
/27	30	2	32
/26	62	2	64
/25	126	2	128
/24	254	2	256
/23	510	2	512
dst

From table 1 above there is a Broadcast and Network ID column where the value is the same ie 2 means each number of users must have 1 piece of Broadcasts ID and 1 piece of Network ID, but for the VLSM method used is the total column for each subnet but for the use of IP Address only using Number of users only. The following is the number of users required in this study can be seen in table 2 below:

Table 2. Subnetting table share printer android

No	Total of Computer	Net ID	IP Range
1	The number of IP Addresses provided by DHCP Server (254)	192.168.3.0/24	192.168.3.1-192.168.3.254
2	Total IP Address provided for share ad hoc network from Mars Wifi app (15) Computers	172.168.100.0/27	172.168.100.1-172.168.100.30

In table 2 above is known at the level of the network hierarchy, there are switches distribution and switch access, the distribution switch has 1 DHCP server with IP Range as shown in table 2 and for Mars Wifi applications there are 15 users.

3. Install the printer driver on the pc that will be created as printer sharing.

The printer is placed on the PC share printer as shown in Figure 6 where the driver from the printer has to be installed on the PC share printer.

4. Installing WiFi Mars app on the laptop, WiFi Mars laptop application can broadcast with Ad-hoc network media.

The installation of Mars Wifi app is used so that laptops can broadcast IP address for mobile phone users of the printer with the Android operating system. Where this application will provide IP Address through Ad-hoc laptop network, and in order to smartphone can communicate with laptop required WiFi media on smartphone to be able to connect with the laptop. Make sure the laptop has got printer sharing from pc share printer to be in sharing again for smartphones.

5. Install the printershare app from google playstore on smartphones and laptops.

Aplikasi printershare can be downloaded from google playstore, this application is used by smartphone to communicate with Mars WiFi application laptop and look for printer sharing from laptop and input into table printershare application so that at the time of printing there is a choice of usage of a printer to print. Then on the laptop application, Mars WiFi also must be installed application printershare in order to connect printersare on android with printersare on the laptop.



Figure 7: Mars WiFi Application

3 Results and discussion

A. Simulation

At this stage of the simulation will be given a description of the process of sharing from the laptop to be able to share the printer to a smartphone using Mars WiFi applications on laptops and printershare applications on android applications. See is a figure 7 Mars WiFi laptops application.

In figure 7 above there are 2 pieces of text box that must be filled, the first is WiFi Name is the SSID that will be broadcast by Ad-hoc network application so that want to use WiFi can use SSID with WiFi Name is andi1. Then for the next text box is Password, where this password uses a WPA2-Tkip security method. Then for printershare applications on the laptop as shown in figure 8 below.



Figure 8: Printershare application in a Laptop

Printershare application on the laptop will appear when the PC Share printer is already in sharing, to be able to print then the printer on the PC Share Printer should be shared first as in figure 9 below.



Figure 9: Share Printer on PC

After the printer is shared by the PC Share Printer then the Mars WiFi app laptop must be connected to the network with the IP address obtained from DHCP Server, then the laptop will broadcast the IP address of Mars WiFi app, so the smartphone can be connected with the laptop because the smartphone is using WiFi media to get IP Address from Mars WiFi app with IP Address 192.168.100.21. Then the next step to do is make static routing on MS-Dos in Microsoft Windows by using the following command:

```
"route add 192.168.3.0 MASK 255.255.255.0 192.168.100.0"
```

Then enter the Net ID address contained in table 1, the Net ID destination to the DHCP server and gateway input from Mars WiFi for more details as in the following command:

```
"route add 192.168.3.0 MASK 255.255.255.0 192.168.100.0"
```

Put the above configuration on MS-Dos in Microsoft Windows and click enter when finished typing. And to check simply by typing "route print". The use of Mars WiFi applications is limited to only 15 printer clients that can connect to WiFi Mars applications, and a safe distance to use Ad-hoc network from WiFi Mars app is 10 m from WiFi Mars laptop application.

B. Implementation

After the configuration either from the PC Share Printer or from Mars Wifi application laptop then the next is to implement from the side of smartphones with Android applications that have been installed shareprinter application version of Android for more details can be seen in figure 10.

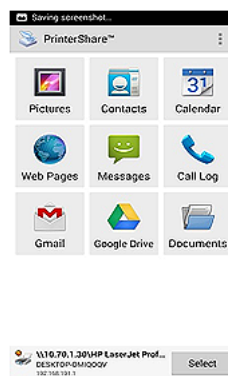


Figure 10: Printershare version Android

If already installed and run the application printershare on android the first thing to do, we have to choose a printer that has been shared by the laptop application Mars Wifi, then simply select the printer and select the printer that has been in the share that "HP Laserjet Professional P1100" so it will look like in the figure 9. After the process has been done then this time can print data from smartphone to printer for more details can see the figure 11 following.

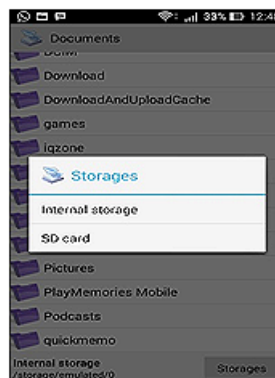


Figure 11: Select the position of the file to be printed

After knowing the position of the file then select the file that will be printed like the figure 12 below.



Figure 12: Choose the file

After knowing which files will be printed then simply click 1x after select print then the file will do the printing from the phone to the printer following is the display of documents to be printed.

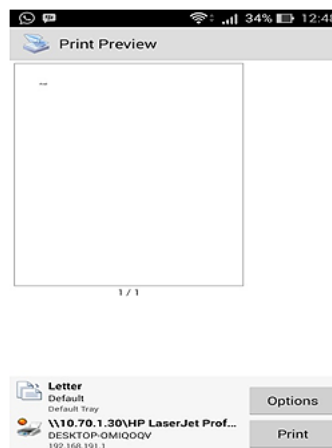


Figure 13: Print preview and print

4 Conclusions

To be able to print from android phone using Ad-hoc network required some applications such as Mars Wifi app, and Printershare both of these applications is a determinant for communication between smartphones with Android applications can communicate with laptops but to communicate with networks outside of the network Mars WiFi required a routing called "Static Routing" without the routing then the communication between Mars WiFi application laptop with PC Share printer will never connect because it has different network. Printershare applications must be installed on 2 devices that is laptop and android that will be used to print documents, photos and so on contained in smartphones.

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