

Manet As A Solution Network Implementation In The Provision Of Services In Regional Disaster Information

S.N.M.P. Simamora
Pusat Studi Teknologi Nirkabel &
Bergerak (PUSDITEK),
TELKOM Polytechnic of
Technology
Bandung, Indonesia
Email : sns@politekniktelkom.ac.id

Ishak Thalib
Department Of Computer Technic,
TELKOM Polytechnic of
Technology,
Bandung, Indonesia
Email : ishakt@telkom.net

Anang Sularsa
Information and Communication
Security Research Centre (ICSRC),
TELKOM Polytechnic of
Technology
Email : anang_sularso@yahoo.com

Abstract - The concept of a wireless network is a packet radio network that uses as its transmission medium. Wireless network is based on the configuration mode is divided into Infrastructure and Ad-Hoc. Mobile ad-hoc network (MANET) is a wireless network from the set of nodes that are not set to use a specific topology. Each node is limited by the coverage area of communication depending on each network card that connects to each other. The software used for information services is a web blog that is written in PHP and CMS (Content Management System) which is called wordpress. Some characteristics of MANET networks using a dynamic topology resulting from frequent changes in node positions. Therefore, we need a protocol that can handle this problem, where in this project used protocol OLSR (Optimized Link State Routing) in MANET networks for information services in disaster areas. On the implementation and testing done already known level of user satisfaction in web-blog information service network so that MANET possible real implemented in assisting the provision of information services in an emergency or urgent.

Keywords : MANET, OLSR, end-user satisfaction, wordpress

I. INTRODUCTION

A wireless network is one type of computer network that uses radio waves as transmission media in the delivery of data in the form of packet-packet between multiple nodes are connected either in the configuration of client / server and point-to-point. Configuring the wireless network is known in two modes, namely: infrastructure and ad-hoc. At this time the public demand for telecommunications services are dynamic, even mobile, has increased in particular for information services [1].

Mobile Ad-hoc Network (MANET) is a form of a set of wireless network nodes that are not located in a position to use fixed topology, in other words tend not to have a fixed routing. At each node MANET Network serves as a router that can build its own network topology so it is not necessary infrastructure (for fixed) in their implementation, which is expected to reduce the growing number of cell stations (backwarding-forwarding devices)

[5]. MANET networks are very precise implemented in the affected areas, where infrastructure (such as base station or cell station) no longer works due to the damage; but are expected once the communication and information must keep it running. Therefore, the concept of MANET appropriately used in disaster areas. MANET networks, in data communications standards that are running, using the protocol OLSR (Optimized Link State Routing). This protocol is an optimization of the Link State Algorithm classics to satisfy the requirements on Mobile Ad-hoc Network.

The issue you want resolved in this study include such as: how the implementation of information services in MANET networks, how aspects of operability of information services in MANET networks, how the role and function of the OLSR protocol in MANET networks.

Therefore, the ultimate goal to be achieved in this research is to implement Network MANET as a solution in the provision of information services in disaster areas.

II. THEORY AND DESIGN

Mobile Ad-hoc Network is a network with no fixed topology, in other words can be mentioned are unplanned and are not fixed, connected to each other using wireless connections, and each node can move the position to build a call to a neighboring node, this network also be multi-hop means that the node can communicate with other nodes indirectly by using the nearest node as a relay [3]. MANET is a collection of mobile nodes without the need for infrastructure that had been prepared previously in forming temporary networks, where each node with a wireless interface to establish communication with other nodes through radio wave data channel [2].

Information services that will be designed using the tools of CMS (Content Management System) which is a web-blog WordPress. This tool is very easy in use for the purpose of making a blog because of its ability to modify and adapt to the needs of its end-users. In addition it also provides support to selected data base by the end-user .

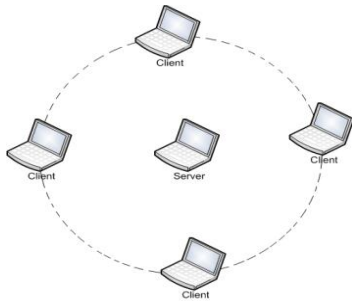


FIGURE 1. A SIMPLE SCHEMATIC OF MANET NETWORKS [7]

In order to emulate a standard protocol which by default has existed on an operating system, applications use `olsrd.exe` (dari www.olsr.org) which is a protocol software support in MANET using the network implementation and use TCP / IP on Windows Operating System . In this study, which used the operating system is Windows XP SP2.

OLSR is a proactive routing protocol, which can immediately provide routing to all existing network destination. This protocol is an optimization of the classical link state. Optimization is based on the concept of MPR (Multipoint Relays). By using multipoint relays reduces the size of control messages. Instead of each connection is represented in all the links, then the node is expressed only on a set of links with neighboring nodes in a multi-point relay status [4]. The use of MPR also minimizes flooding of control traffic. This technique significantly reduces the number of retransmissions of broadcast control messages. Messages neighborhood and topology (usually called hello messages and topology control (TC) message) [6].

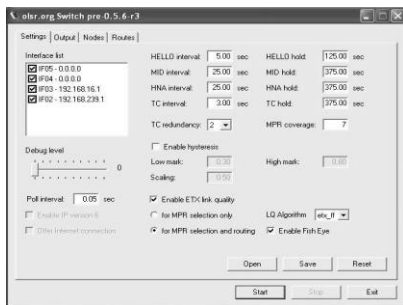


FIGURE 2. DISPLAY APPLICATIONS OLSRD [8]

III. RESEARCH METHODOLOGY AND DESIGN

The research methodology aimed at setting the stages of systematic and terstruktur in progress research in support of scientific activities. In this research phase that is used like:

- Interview: conducted interviews and exchanged opinions about the discussion concerned with the process of making this final project.
- Book study: study manuals, documentation, articles, and includes also several websites on the internet that relate to issues that will be discussed. This is done to understand the basic theories or literature in need in supporting the research or project of this final.
- Polling: collecting data from respondents to examine the extent to which the user satisfaction of information services built.

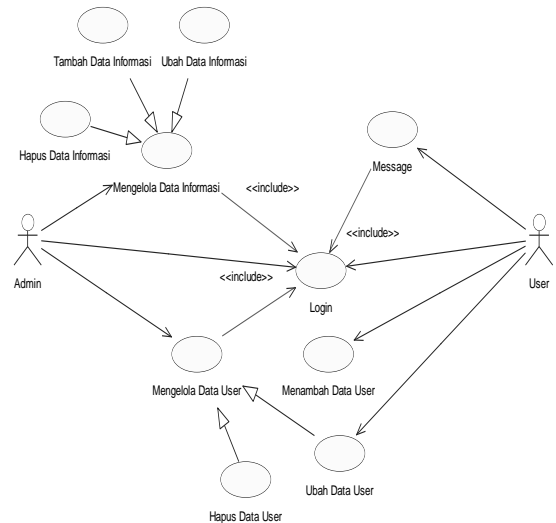


FIGURE 3. INTER-FACE DESIGN USECASE

In the design of the interface presents a functional interface that has been created using a system that explains usecase description / depiction of an activity system interface made.

TABLE 1. ACTOR DEFINITIONS

No	Actor	Description
1.	Admin	The person in charge and have access rights to perform data management operations as well as User Admin menu.
2.	User	People who can only perform the process view, send message, login or register a user menu.

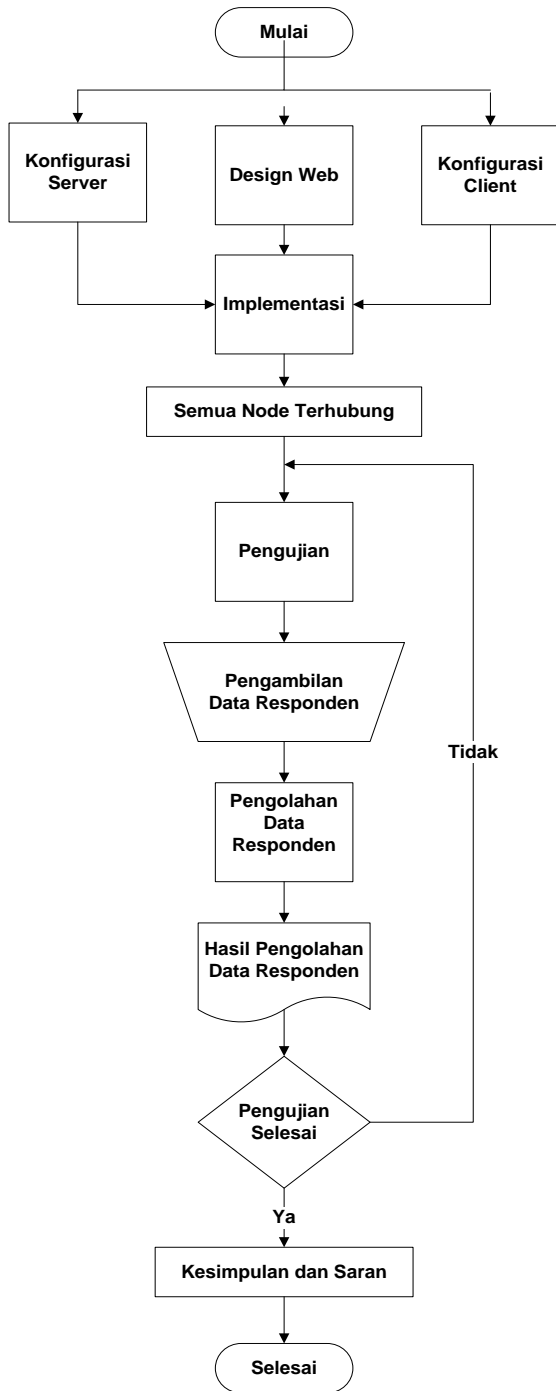


FIGURE 4. FLOW-CHART DESIGN AND TESTING SYSTEM

TABLE 2. DEFINITION USECASE

No	Use case	Description
1.	Login	It is the process of checking who has the right permissions to access the data management process in this particular information is mandatory admin login to update its functions relating to the data base which must check the validation of user who access these functions.
3.	Managing Data Information	Managing data is a process of generalization of information that includes three processes ie delete data, modify data, and input data.
4.	Deleting Data	It is the process of deleting data information into the database
5.	Changing Data	Is a data conversion process that includes, changing the data information
6.	Input Data	It is the process of entering data into the database information
8.	Managing User Data	Admin to manage users who have registered
9.	Removing User Data	Admins do deletion of user data or delete a user who has committed registration
10.	Editing User Data	Admin to edit user data
11.	Adding User Data	It is the process of entering data into the database information
12.	Message	Users can send a sentence or a message into information that has been in access

IV. IMPLEMENTATION AND TESTING

These features made in the information services include:

1. Home, which contains a collection of the data that has been done pengupdaten by admin.

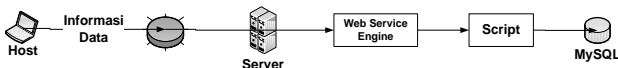


FIGURE 5. SCHEME BACK-END SYSTEMS

2. Help, where in the relief features are divided into two namely:
 - a) Assistance News, contains articles related to the assistance that has been given where it serves as a news article which can be read by any user.
 - b) Help List, contains a list of aid that has been given by the victim either of society or the government.
3. The victim, where the features of this aid is divided into two namely:
 - a) Victim News, contains articles related to premises that have been given assistance where it serves as a news article which can be read by any user.
 - b) List of Victims, contains a list of victims who have obtained the results of the team evacuated.
4. Video, contains a collection of videos received from the various recordings by the evacuation team, which this video explains the circumstances disaster area and surrounding areas.
5. This article, in this feature provides a variety of collection of articles ready to read about the flood disaster area and surrounding areas.
6. Photo Gallery, provides a variety of group photos of the evacuation of flood zones and surrounding disaster area.
7. Guest Book, this feature provides service to the user where members are welcome to message or criticism or suggestions to the web-site information services disaster area flood disaster that has been provided.
8. Contact Information, provides information that can dihubungkan to find families who are victims or likely to give a good aid in the form of funds or goods.
9. Shoutbox, additional features on the web-site where the form of information service similar to a chat feature that can only be accessed upon registration.
10. Registration, where any who wish to provide criticism and suggestions or give a response on the web-site information services provided required a user to register as one of the requirements.
11. Log In, requires for us as a user who has to register, are required to enter your username and password as the data has been loaded at the time of registration where the login process is one of the requirements on web-site information services.
12. Admin Menu, where this is from the menu interface when the admin has admin login authentication system, where in the admin menu is an admin can perform all admin activities as such do up-dating information, removal of information or user data or input data and other information.
13. User Menu, is when the user interface which has been registering and logging in will go to the user, where user menu itself can look like the following.



FIGURE 6. INTER-FACE HOME WEBSITE INFORMATION SERVICES

- Measurement of user satisfaction was conducted in order to see how far the feedback can be given to the use of a service by the end-user when using the services provided. Generally, the quantitative measurement using a calculation of a number of qualitative results of end-user opinions represented in a poll conducted, with the number of respondents (end-users) as much as thirty. The characteristics of respondents who were involved are as follows:
- a) Telkom Polytechnic Students
 - b) Has to know and understand the Internet and its services
 - c) Age range: 18 till 20 years
 - d) Condition of the respondents assumed in good health and understand the questions asked.

TABLE 3. LEVEL OF SATISFACTION OF RESPONDENTS VALUE

Weight (Index)	Satisfaction Score
5	Excellence
4	Good
3	Fair
2	Poor
1	Bad

To calculate the value of satisfaction in every aspect of measurement is formulated with a model: if there are a number of n weighted score that will be assessed by the n respondents, then the value of every aspect of satisfaction is expressed with the formula:

$$\frac{\sum_{i=1}^N (\text{weight_score}_i)}{N}$$

Eq.1

Where: weighted_score_i = respondents_i who chose weighted score (1 to 5)

N = number of respondents, thats 30

i : the respondent from 1st to 30th

Tests carried out using two scenarios (distinguished by the position and place, carried on lecturing building TELKOM Polytechnic, Bandung) with each aspect of a user-friendly and operability aspects, as follows:

a To explore the aspect of a user-friendly who will explain how the opinions of respondents in terms of interface on the web-site information services provided, designed the question as follows.

Bagaimana menurut anda Interface pada web-site layanan informasi yang anda akses ?

b To explore user-friendly aspects that will explain how the opinions of respondents about the features the web-site at present, then the question is designed as follows:

Bagaimana menurut anda dengan fitur-fitur yang diberikan pada web-site layanan informasi yang anda akses ?

c To explore user-friendly aspects that will explain the assessment function from the features Web-site information services; test whether these features are considered adequate in preparing flood information service, then designed as follows:

Apakah fitur-fitur yang diberikan pada web-site ini sudah dapat dikatakan memadai untuk pengimplementasian pada layanan informasi web-site bencana banjir ?

d In order to explore aspects of operability that would explain the quality of network access is provided, then the question is designed as follows:

Bagaimana kualitas akses jaringan yang kami sediakan ?

e In order to explore aspects of operability that would explain fungsionalibilitas of OLSR protocol used in MANET networks, then the question is designed as follows:

Apakah Protokol OLSR yang digunakan berfungsi dengan baik pada jaringan yang anda akses ?

f In order to explore aspects of operability that will explain the assessment of network operations and

web-site information services, will be tested whether the network and web-site information services that have been built, already meet the standards implementation at the presentation of Service floods, then the question will be designed as follows:

Apakah menurut anda pengoperasian jaringan dan web-site sudah bagus digunakan untuk kondisi daerah bencana atau keadaan darurat ?

The test results for each scenario:

a Question Number 1 in polling respondents viewed from the user friendly aspects of the calculation result is obtained as follows:

$$\text{Scenario-1: } \frac{(5x5 + 24x4 + 1x3)}{30} = 4.1333$$

$$\text{Scenario-2: } \frac{(7x5 + 23x4)}{30} = 4.2333$$

Analysis:

In the poll data processing on the user friendly aspects of the views of leading questions is about assessing the interface on the web-site information service provided, where the results obtained, obtained by 4:13 and the 4233 assessment, this gives the index: good.

The reason for this result, because the web-site information service provided still requires further improvement, to make the respondents more interested. For that in shaping respondents'satisfaction will be improving the interface design on the web-site information services.

b Question Number 2 on the polling respondents viewed from the aspect of user- friendly calculation results obtained as follows:

$$\text{Scenario-1: } \frac{(3x5 + 24x4 + 2x3 + 1x3)}{30} = 3.97$$

$$\text{Scenario-2: } \frac{(6x5 + 23x4 + 1x3)}{30} = 4.16667$$

Analysis:

In the polling data processing on the user friendly aspects of the views of leading questions is about assessing the features of a web-site information services provided where the results obtained from the respondents obtained value of 3.97 and 4.16667, this gives a relatively good index.

The reason for this result, due to features web-site services the information presented has fulfilled standard criteria for the respondents. Thus, in order to improve the satisfaction level of respondents, will be increased even more on features web-site information services that already exist.

c Question Number 3 on the polling aspects of user-friendly calculation result is obtained as follows:

Scenario-1: $\frac{(1x5 + 23x4 + 6x3)}{30} = 3.8333$

Scenario-2: $\frac{(6x5 + 24x4)}{30} = 4.2$

Analysis:

In the polling data processing on the user friendly aspects of the views of the questions is leading to the assessment function features Web-site information services. Want to know whether these features can already be said representative for the implementation of flood disaster information services. Results showed values: 3.83 and 4.2, this gives a relatively good index.

By considering the results of this satisfaction, showing the average respondents rated the features presented on the web-site information service is relatively good, already accommodate the needs of users to access information services.

d Question Number 1 about polling operability aspects in the calculation results obtained as follows:

Scenario-1: $\frac{(4x5 + 19x4 + 6x3 + 1x3)}{30} = 3.86667$

Scenario-2: $\frac{(1x5 + 17x4 + 12x3)}{30} = 3.63333$

Analysis:

In the poll data processing on operability aspects contained in the question is directed at the quality of access to a network that was built. And the results obtained from respondents showed results of 3.87 and 3.63333, this gives a relatively good index.

This shows the quality of MANET Networks as the presentation of information services infrastructure is relatively good. This result is reasonable due to MANET networks are tested on in-door conditions.

e Question Number 2 in polls operability aspects in the calculation results obtained as follows:

Scenario-1: $\frac{(3x5 + 23x4 + 4x3)}{30} = 3.96667$

Scenario-2: $\frac{(29x4 + 1x3)}{30} = 3.96667$

Analysis:

In the poll data processing on operability aspects contained in the question is focused on the work of the protocol used in OLSR MANET networks are built. And the results obtained from respondents was the result of 3.97, this gives a relatively good index.

This shows, at the time of testing done, OLSR protocol has worked relatively well in each node because the tests are made on the condition of in-door delivery.

f Question Number 3 on the poll operability aspects in the calculation results obtained as follows:

Scenario-1: $\frac{(5x5 + 22x4 + 2x3 + 1x2)}{30} = 4.0333$

Scenario-2: $\frac{(4x5 + 24x4 + 2x3)}{30} = 4.0667$

Analysis:

In the poll data processing in which there are aspects of operability of the questions is leading to a network operating assessment and web-site information services; want to know whether the network and web-site information service that can be said to be built is already sufficient to implement the flood disaster information services. And the results obtained from the respondents is the result of 4:03 and 4.0667, this gives a good index.

This proves that so far MANET network is needed as an alternative to the provision of network and information services support solutions in the disaster area, or in an emergency.

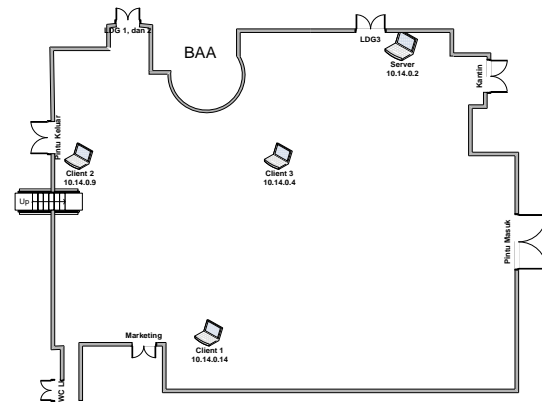


FIGURE 7. SITE-PLAN FOR SCENARIO-1

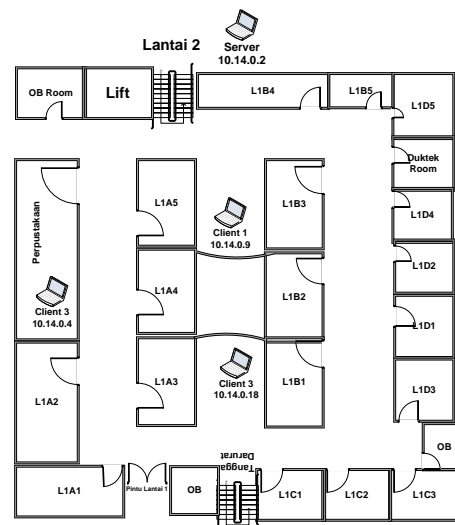


FIGURE 8. SITE-PLAN FOR SCENARIO-2

V. RESULT

Implementation Network MANET has been going well, this is based on the test results are technically in the field, and the results of testing aspects of operability in the opinion of respondents saying is good.

Service information is presented, based on test results, it is good for user-friendly approach, and can be used as a reference for use in the presentation of information in the disaster area.

Location-position and lay-out of each node, the MANET Networks, network operability affect, by reason of the nature of connectivity based on electromagnetic waves, and there is no assurance capabilities of nodes, which functioned as a relay-node (backwarding-forwarding devices) running with good.

Use OLSR protocol is absolutely necessary to build a MANET Network and based on testing, OLSR protocol has been going well, this proved, based on each node can function as a relay (backwarding-forwarding devices) so that the Information Service can be accessed by the neighboring nodes (neighbor nodes) in the MANET network that has been constructed.

It is suggested, for network construction performed on an indoor location due to indoor locations, the small likelihood of interference between networks as well as to minimize disruption of weather and natural properties of electromagnetic waves, and the number of nodes should be more numerous and spread terposisi geometricaly balanced (uniform) so that the benefits of technology Network MANET using OLSR protocol is visible.

MANET network suitable for use in disaster areas as an alternative solution to support its infrastructure network in terms of providing information services.

REFERENCES

- [1] Borom, Emily. Study Offers Early Look at How Internet is Changing Daily Life. Stanford Institute for the Quantitative Study of Society, 2000.
- [2] Mohaprata, Prasant and Srikanth V. Krishnamurthy. Ad-hoc Network Technologies and Protocols, Springer Science + Business Media. 2005.
- [3] Mulyanta, Edi S. Jaringan Wireless Komputer. CV Andi Offset, Jakarta, 2005.
- [4] Sarkar, Subir Kumar, T G Basavaraju, and C Puttamadappa. Ad-hoc Mobile Wireless Network Principles, Protocols, and Applications, Aurbach Publication. 2008.
- [5] Simamora, S.N.M.P., "WLAN Implementation in High-floor Indoor Office Building for Communication Successfull Solution", Proceeding of International Conference on Open Source for Higher Education (ICOSic), Sebelas Maret University (UNS), Solo, halaman : 135 s.d. 138, 2010.
- [6] T. Clausen and P Jacquet. Optimized Link State Routing Protocol (OLSR) Request for Comments 3626, Internet Engineering Task Force. 2003.
- [7] Lord Sing, V., Simamora, S.N.M.P., Siregar, S. "Evaluasi Peformansi OLSR (Optimized Link State Routing) pada Mobile Ad-hoc Network". Jurnal Ilmiah Ilmu Komputer Vol.7 No.2 Maret 2011 hal.177-186. Fak. Ilmu Komputer, Universitas Pelita Harapan.
- [8] www.olsr.org. Accessed on: December, 21' 2010