

Suggest a method for exchanging information in ad hoc networks

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Abstract--- *The importance of studying private networks in communication and information exchange has increased due to the ease and speed of building in emergency situations among members of rescue teams in the site of large-scale disasters when the infrastructure cannot be used at the time of the disaster, and that the technology of private networks is non-wireless stations without the use of base stations or Router or Access point. The routing protocol for establishing a path is important because the stations move frequently, and the connection break cannot be known in real-time. Therefore, a proactive way to find link separation is by continuous exchange of routing information. In the proactive routing protocol, each party sends routing information on a regular basis. In this paper, information about the application layer was added when creating the route and a simple information distribution system was created through the simultaneous distribution of information held by each station at that time.*

Keywords: *Ad Hoc, Ubuntu, Exchange of information, OLSR, AODV*

I. INTRODUCTION

In recent years, and in disasters and sudden accidents, the need for extensive studies on decentralized autonomous networks has emerged, and building a network for exchanging information between members of the rescue team has become an important issue. On the other hand, ad hoc network technology, which builds a network using only wireless stations without using stations Essential, attention-grabbing.[1]

We propose to create a system for sharing information in emergency and disaster situations through ad hoc networks characterized by not using the usual communication infrastructure, here, in order to achieve the same platform on many terminals, we focus on Ubuntu, which is a Linux system, and build an information-sharing system.

In this paper, we focus on a method for creating a route for a custom network, adding application layer information to a control package for route building, and proposing an efficient system for distributing information. Usually, the network is handled independently by the network layer that builds the network and the application layer that uses the network. However, in ad hoc networks, the layers interact from the upper layers to the lower layers, so in order to take advantage of the properties of custom networks, each layer must be linked. This time, we added the information held by the station to the control package to build the route, created a route, and set up a system for distributing the information.

II. PREVIOUS STUDIES

The study [2] proposed a system that uses Vehicular Cloud Networks (VCNs) to collect data between rapid relief teams in the disaster area, as this system provides mixed wireless networks: a cellular network and a network dedicated to disaster management. The implementation results of the proposed system were more reliable and efficient than The traditional system with fewer jumps.

The study [3] provides security services in telecommunications networks that provide information exchange in emergency situations. It is represented in ad hoc wireless networks such as dedicated mobile phone networks, wireless sensor networks, and wireless mesh networks that provide communication and emergency response services, special security requirements, data integrity, key management, authentication, and availability. And access control.

The work carried out in the study [4] reveals the real experiences presented in Poll surveys regarding the application of ad hoc networks in disaster scenarios and their role in saving many lives and reducing the number of victims. Domains are also surveyed and review of the major contributions that researchers have made in the past decade. and clarify the need for a prerequisite for obtaining a dedicated integrated disaster response system. The use of smartphones is crucial to achieving this goal because it is a portable device that civilians use on a daily basis, in addition to limiting special solutions in the field of disaster response networks to rescue teams that carry specialized electronic devices.

III. AD HOC NETWORK

It is a network created only temporarily at this site by stations without using a base station, it is without infrastructure like other base stations and can be used at anytime and anywhere and is created as needed and disappears when it is not needed, then every station has a router function, so the routing protocol is important to establish a route because the stations move frequently, it is possible to connect from peer-to-peer remote where the connection is made by multiple hops using the relay function of each terminal, and users can join the network simply by bringing their own terminal without any Complex settings, as well as scalability and high efficiency in frequency and power resource use. [5]

Since it is a wireless network, unlike a wired network, disconnection cannot be known in real-time.

Therefore, there is a proactive way to find link separation by a continuous exchange of routing information. In a proactive routing protocol, each partner sends routing information on a regular basis.

IV. UBUNTU

Many institutions and governments resort to relying on open-source systems because they provide quite a lot instead of buying other systems and that Linux is an open source system.

Some people have adopted and modified it to create other operating systems called Linux distributions, and Ubuntu is one of these distributions, which is the best, most popular among users. It is characterized by ease of handling, and stability, and its support are also strong and of course, the degree of safety is very high, and the design and general shape is very distinctive and easy to deal with by any user.

Ubuntu not only works on commercially available desktop personal computers and laptops, but also on small, inexpensive, ultra-high-resolution laptops. [6]

V. CONVENTIONAL ROUTING PROTOCOLS

To illustrate the characteristics of the proposed routing protocols, we will present the following conventional routing protocols:

(1) Optimized Link State Routing (OLSR) protocol

The OLSR protocol uses in mobile ad-hoc networks, and it is a pro-active protocol, based on tables and uses a technology called multipoint relaying (MPR) to spread messages. Applications of this protocol currently work under Linux, Windows, Mac OS X, FreeBSD and NetBSD. The OLSR protocol was originally designed to be a well-programmed and, structured protocol to facilitate its management, expansion, and portability to other operating systems.[7]

In OLSR, routing information is exchanged regularly to create a routing table. At that time, for effective dumping, the node responsible for

broadcasting is identified as MPR however, in order to build MPR, each node sends HELLO messages on a regular basis. [8]

The OLSR protocol is currently one of the most stable and scalable protocols.

(2) Ad hoc On-Demand Distance Vector (AODV) protocol

Is a routing protocol designed for mobile Ad hoc networks. This protocol enables dynamic multi-hop routing between computers.

The AODV protocol is based on the proactive Destination-Sequenced Distance Vector (DSDV) protocol, but due to some of the names it suffers, such as the absence of sleeper nodes, the overload and the permanent preservation of the path, even when it is not needed, work has been done to develop it and find a new protocol, which is AODV, which differs. It is designed to reduce overload and permanently maintain the path even when it is not needed.[9]

In AODV, when you want to send a packet, the broadcast packet is forwarded (RREQ), and the target node returns the reply (RREP), so each station updates the routing table and builds the shortest path. Both send control packets to build routes. [10]

VI. INFORMATION EXCHANGE SYSTEM

Here, we suggest an information-sharing system with an ad hoc network.

This system uses two types of terminals. One is an information distribution station that contains information to distribute over the entire network, and the other is an information receiving station. The information distribution station divides the information to be distributed according to the length of the packet and adds it to the transmission queue. Then one packet is outputted from the transmission queue and broadcast to the surrounding terminals.

For compatibility with the division of information, information on the number of information sections and the number of packages between them has also been added. After that, a serial number is assigned to the sent package, and the number is added to each packet sent. By doing this, when a packet is received from the same device over multiple paths, it is possible to determine which route is the most recent.

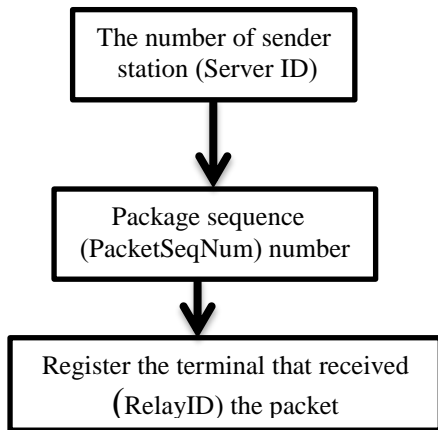
The device receiving the packet, whether it is an information distribution station or an information receiving station, transfers the packet to the next station if it is the first received beam. That is, the received packet is added to the transmission queue for each terminal. At the same time, the routing table is updated as in the scheme(1)

Coordination takes place and as shown in scheme 1 for each information transmitting station, so it suffices to secure a table for the total number of terminals in the network to a maximum.

It can be stored not only in memory but also in external storage area. When each terminal sends a

packet, it adds the head shown in scheme 2 and sends

it.



Scheme 1: The steps of the routing table for each station

Coordination takes place and as shown in scheme 1 for each information transmitting station, so it suffices to secure a table for the total number of terminals in the network to a maximum.

It can be stored not only in memory but also in external storage areas. When each terminal sends a packet, it adds the head and sends it, the Header information to be added to the packet, as is the table .1

Struct	packetHeader	Explain
int	ServerID;	// ID of information posting node
double	ServerLatitude;	// GPS location of server node
double	ServerLongitudinal;	
int	SenderID;	// ID of packet sending node
double	SenderLatitude;	// GPS location of sender node
double	SenderLongitudinal;	
int	RelayID;	// if Direction == 2 then // the node with this ID must receive this packet
int	PacketNO;	// Packet #
int	PacketTotalNO;	// Packet Total #
logn	PacketSeqNum;	// Sequence number of packets
int	PacketLength;	// Packet Length
unsigned char	Direction;	// Packet Direction
unsigned char	Checksum;	// CheckSum

Table .1 Header information to be added to the packet

In this package format. The direction of information distribution is determined by the direction.

When Direction = 1, the information is distributed from the information distribution station to the entire network, and it represents the broadcast connection by User Datagram Protocol (UDP), so it does not need to send data to establish a connection, as the data is sent to the entire subnet, and any computer in The subnet receives the same data, and it divides the message to be sent into units called each unit (datagram), where each unit has placed the address of the sender to it.

And when Direction = 2, the information is sent from the information receiving station to the information distribution station. It is a unicast connection by Transport Control Protocol (TCP), which provides reliable error-free transmission of the byte flow between two hosts communicating with each other, as it opens a direct connection With the other party, then sends the data, and here each unit is independent on its way from the rest of the units, so maybe each unit takes a different way than others, and then the other party collects them.

It is worth noting that the TCP protocol provides us with a guarantee that the connection is

completely sound, and if an error occurs, it will retransmit until it is correct. As for UDP, it does not provide us with any guarantee because the goal of this protocol is to deliver the required message quickly. Whereas, UDP depends on the CONNECTIONLESS method, which does not provide a direct connection between the sender and the receiver, while TCP relies on the CONNECTION-ORIENTED method, which reserves the entire communication line between the sender and the receiver.

ServerID is the identifier of the information sending station, and when replying, it means the target terminal. Server Latitude and Server Longitudinal represent the location information of the information transmitting station, and here the coordinates obtained by the Global Positioning System (GPS) are used. This time, it will be used to display the positional relationship of each terminal on the user screen, but in the future, it will be used for routing with location information.

Sender ID is the identifier of the terminal device that sent this packet.

When sending information, ServerID & Sender ID are identical, but when the device that received the packet is forwarded, Sender ID becomes

the identifier of that device. From the two information, ServerID and Sender ID, the packet recipient knows it

Sender Longitudinal represent packet sender location information as well as server information.

Relay ID is used when Direction = 2, that is, when the receiving end sends the information to the information distribution station. According to the routing schedule at the time of information distribution, each station is the front end.

A packet is sent to the end. The recipient of the package specified at this time is RelayID. However, since the information is sent to the information distribution station by TCP, the IP address of the receiver device is determined at that point, and there is no problem even if this element is not included. It is given for double confirmation. Packet NO and Packet Total NO are available to receive the information separately. Due to the use of Ethernet, a single packet is basically 1500 bytes in size, and large information cannot be sent simultaneously. Therefore, it is essential to split and send each package. Therefore, the number

must send to Sender ID to respond to the ServerID, and updates the routing table accordingly.

of partitions is set on Packet Total NO, and the package number is determined by Packet NO. Recipients can get a lot of information by arranging them side by side.

PacketSeqNum is a package for distributing information by an information distribution station. Increase by 1 each time you send a message. The terminal on the road looks at PacketSeqNum when updating the routing table, confirms that it is newer than the packets received so far, then updates the table. When a packet is received from an old PacketSeqNum, it means a package came through a different path, which means that the route takes a long time. Therefore, when a packet containing an old PacketSeqNum is received, the routing table is not updated.

Packet Length represents the length of the packet and the checksum of the entire packet in 1 byte. The flow of these information distributions is shown in figure 1

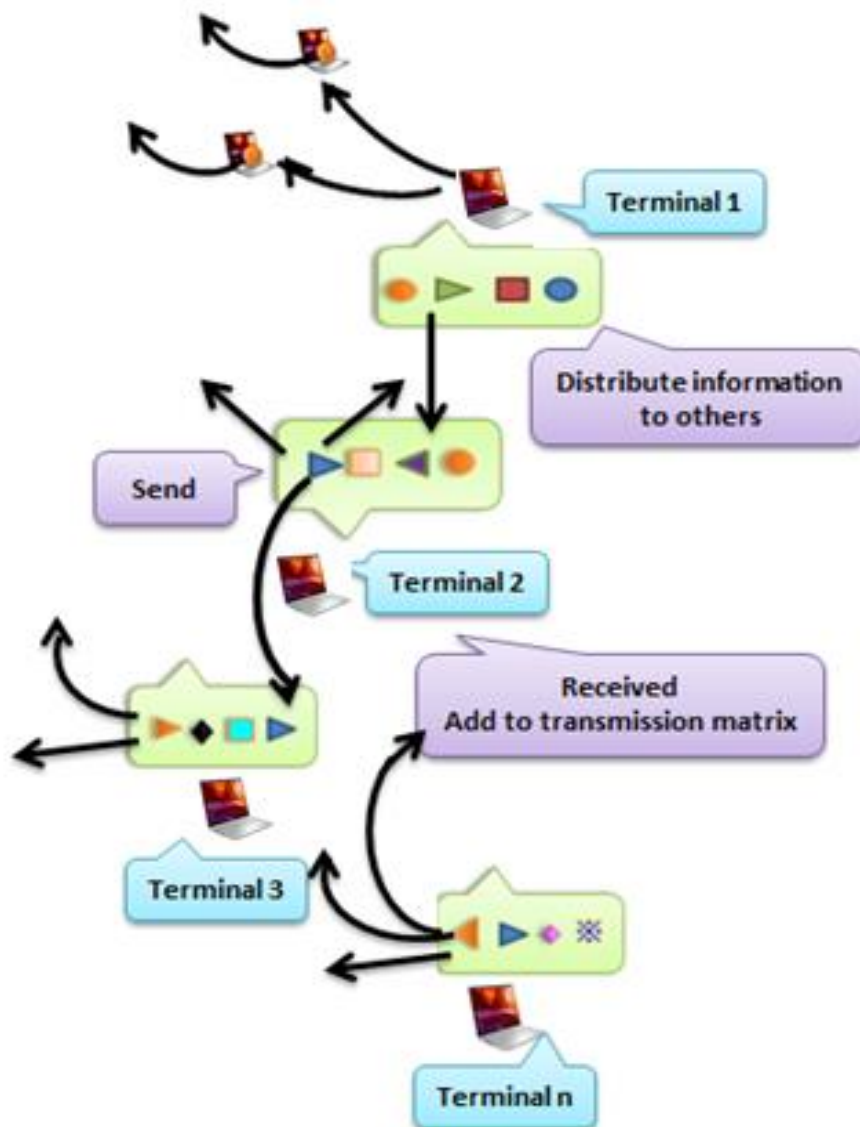


Figure 1: The flow of the proposed information distribution system

VII. INFORMATION DISTRIBUTION SYSTEM ALGORITHM

Content is split to be sent and distributed to others, upon receipt, add to the transmission queue, and if you receive the same data, ignore it.

We take one of the transmission matrix and distribute it to the surroundings, then deliver a message and inform the neighboring stations of your presence.

To send a message to the source, follow the above path in the opposite direction. Reception cannot be confirmed for simultaneous distribution.

But reception can be confirmed for communication 1 to 1

VIII. FEATURES OF THE PROPOSED ROUTING PROTOCOL FOR DISTRIBUTING INFORMATION

The routing protocol for distributing information proposed in this study is a routing protocol with characteristics of both OLSR and AODV.

OLSR and AODV both need to send broadcast packets to build a network. In the proposed routing protocol for distributing information, the information that the node wants to pass to everyone and distribute together is added. Since this includes the frequent exchange of HELLO messages, the proposed method is most effective for networks whose topology changes frequently. This is true even in a network with little change, but in this case it is not necessary to exchange routing information frequently, which adds to the waste.

Each terminal can be classified into two types: an information distribution station and an information receiving station. All terminals can receive information, but distributing information is a function that only necessary stations possess (not all terminals have to distribute information).

In the proposed method, the part that frequently exchanges information delivery packets instead of HELLO messages is similar to OLSR. However, since routing information is not added to the package and the schedule for each station is updated, it is similar to processing routing information for AODV.

IX. CONCLUSIONS

In this study, we proposed a new routing protocol for ad hoc networks. In the past, the routing layer and the application layer were independent, and the necessary packets were exchanged between them. Here, application layer information was added when the route was created, and efficient distribution of the information was performed. In the future, it will be necessary to increase application examples and find more effective ways of using ad hoc networks,

providing adequate and reliable security services and exchanging information securely.

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