UDK 621.39

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SIMULATION PROCESSES AND PERFOMANCE ANALYSIS OF ROUTING PROTOCOL IN CORPORATE NETWORK

Abstract. It is created simulation model of the corporate network MANET with routing protocol based on the GRP. It is illustrated the effectiveness of the protocol for transmission of multimedia traffic.

Key words: protocol, routing, MANET.

Statement of the problem

The most important condition for improving the competitiveness of enterprises is the introduction of modern information technology (IT). To improve the quality of products and services in the business actively implemented corporate information systems. The most important element of the IT infrastructure of corporate networks are designed to ensure interoperability of various applications of information systems. The need to provide quality service modern traffic transmitted over IP-based networks, makes high demands on the efficiency of the transmission of data packets from the sender to the recipient. The task of routing in enterprise networks is solved under the condition that the shortest route, which would ensure transmission of packets in minimum time depends on the network topology, bandwidth and load lines. Network topology changes as a result of the telecommunications system by connecting new nodes and links.

Application of new promising approaches is relevant to the task of routing, for function can improve the quality of corporate network by reducing the complexity of constructing optimal routes.

Analysis of recent research

Today science direction in the field of telecommunication systems with variable topology networks is intensively developed. Such systems are called MANET (Mobile AD hoc Networks) [1]. In [2] proposed a way

to expand the range of scenarios in which the work of routing protocol is effective for transmission of multimedia traffic.

The wording of the purposes of Article (problem)

Objective is to develop a simulation model of a network using MANET routing protocol GRP and study its properties in the transmission of multimedia traffic.

The main part

MANET (Mobile Ad hoc Network) - wireless decentralized networks, that self-organize and consist of mobile devices. Each device can independently move in all directions and as a result often terminate and connect to other mobile nodes. Decentralized wireless networks do not have a permanent structure. Client devices are connected "on the fly", forming a network with random (ad-hoc) topology. Each node of the network tries to send data administrated to other nodes. However, determining which node to forward the data is make dynamically based on network connectivity. Minimal configuration and quick deployment permit to use self-organizing network in emergency situations, during the fight and in other situations where there is no pre-deployed communications infrastructure [3-4].

One of the problems of realization of class MANET networks is to ensure efficiency, safety and reliability of data at the time when randomly changing physical network topology. At the transport level Open Systems Interconnection model (OSI) protocol is based transmission control data - transport mechanism of streaming data from the previous installation of the connection. The protocols of the transport level protocols provide higher levels of work up to the application. Therefore, reliable delivery protocols necessary for the work of many networking applications, such as network file services, messaging services, hypertext transfer services and others that are also used in MANET. However, restrictions imposed by network MANET, do not allow the use of existing Transmission Control Protocol data [5-8], calculated on a stable network topology [9, 10].

Choice of routing protocol makes a significant impact on the efficiency of the network organization and presents an important task for the network administrator. There are factors that significantly influenced on the choice of routing protocol: congestion of network topology and complexity of network reliability requirements, requirements for the protection of the network, compatibility of routing protocols (in combination with other segments of the network), the ability of software routers, qualifications of staff.

IEEE 802.11 - the original standard for wireless local networks based on wireless transmission of data in the range of 2.4 GHz, supports data transfer speeds of up to 1.2 Mbit / s. Standard 802.11b (MANET) increases after the 802.11a data rates up to 11Mbps on the same line 2.4 GHz band [11]. It uses an access method CSMA CA, which helps avoid the problems associated with the sensitivity of the routing path, and method of forming a broadband radio signal DSSS (Direct Sequence Spread Spectrum).

In this paper a special routing protocol GRP (Geometry based Routing Protocol, routing protocol based on the relative position of nodes) is used. It is based on which simulated in the environment of OPNET quantity deleted, copied and created packet delay in the network, routing traffic sent and received. It was analyzed the different metrics to evaluate the performance of the protocol:

- capacity: the total amount of traffic passing through the node;
- the share of delivered packets: the number of received packets divided by the number of sent packets;
- delay: delay from end to end.

In the GRP is required to maintain the routing table before or during the transfer process. In addition, GRP offers a number of advantages over ad-hoc routing. This protocol of forwarding packets allows to adapt to topology changes: the alleged select the next node, if an intermediate, which was used in previous packages are unavailable. This approach does not require the support of the routing table, but informa-

tion about the topology of placing nearest neighbor without routing [12]. Routes can be changed from node to node and from package to package by considering parameters QoS, relating to the transition to the next neighbor or delay and throughput. One of the major drawbacks of this protocol is the difficulty and expense required for maintenance of local distributed database services. However, services cannot be fully shared routing as well as the location of nodes and data is an integral part of distributed traffic information and mobile sensor networks used for control and monitoring applications. For example, the possibility of sending unaddressed and multicast messages to a specific user geographic areas.

The network consists of N mobile nodes randomly distributed in $X * Y$ rectangular area involving wireless communication line. In this paper, the simulated performance units based GRP routing protocol and analyzed using the process model, network model and node (Figure 1-3).

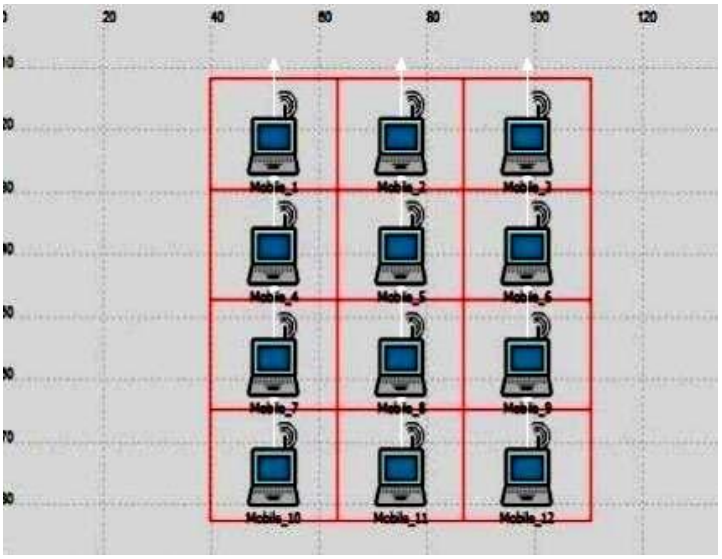

Figure 1 – The model of network

There were used the following parameters in simulation wireless MANET:

- transmission range - 100 m,
- data rate - 11 Mbit / s,
- simulation time - 1 hour
- the number of units - 12

 ISSN 1562-9945

• field size - 100 x 100 m

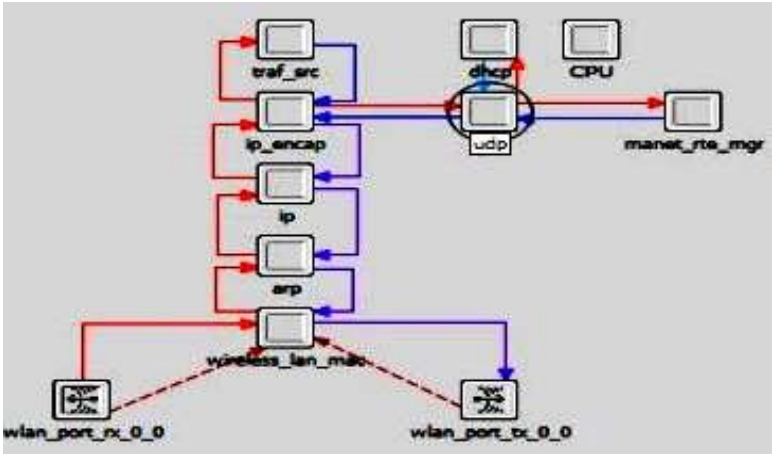

Figure 2 – The model of node

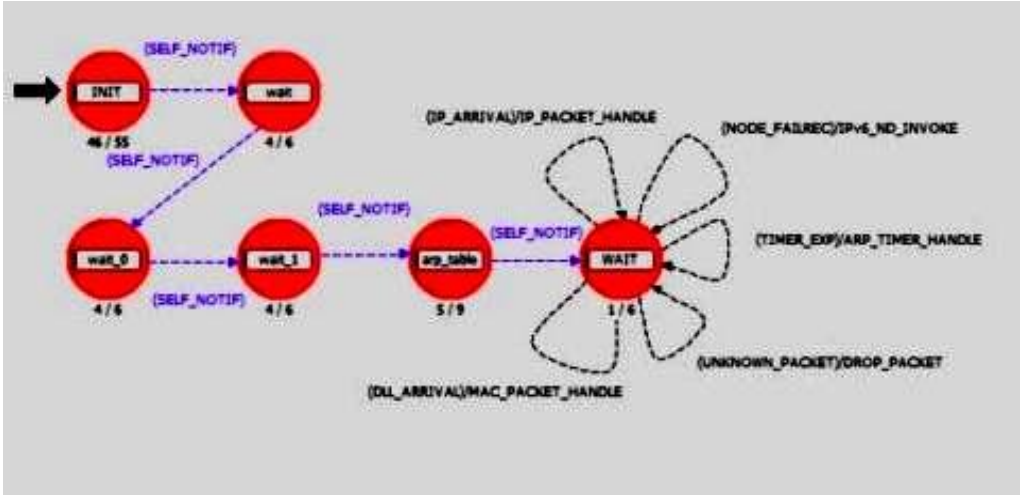

Figure 3 – The model of process of traffic transmission

Figure 4 is represented delay in network by using GRP routing (x-axis - time in minutes, y-axis - the delay in nanoseconds): red tagged received traffic (pkts/sec), and green - traffic sent (pkts/sec).

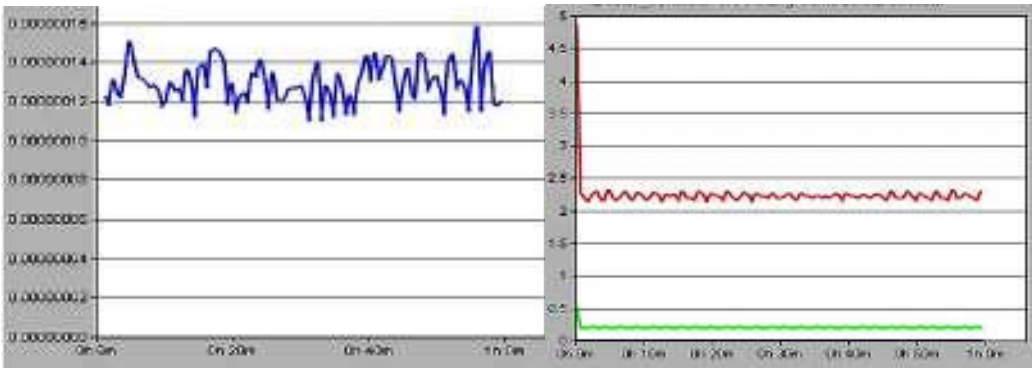

Figure 4:a – End-to-end delay,
b - transmission delay of packet traffic

DC offset in GRP MANET routing traffic in the network is notable (Fig. 5). GRP traffic is measured in packets/second, where the total received traffic represented in bits/second. Posted in MANET traffic is given in bits/second and packets/second. You can see that there is no jump in the transmission of information flow in the network.

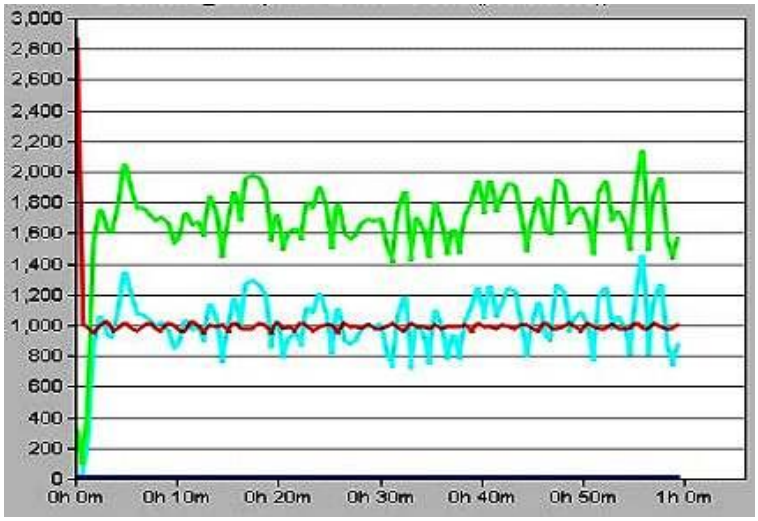

Figure 5 - Input and output traffic based on protocol GRP in MANET network

Conclusions and recommendations for further research

Simulation results demonstrate high performance GRP protocol for total delay sent and received traffic routing input and output traffic bagged, the creation, adoption and destruction packets. Our further research will focus on determining the effective parameters MANET-network, including its bandwidth, using other routing protocols such as DSDV.

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