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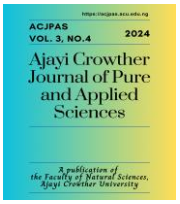

Article

Development of an Improved Routing Protocol in Wanet

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Abstract

The aim of this article is to demonstrate the use of OMNeT++ to simulate the creation of a wireless network and secure data using encryption algorithms. This work provides a brief overview of wireless network categories, defines wireless LAN networks, briefly discusses these technologies and devices, explains Wi-Fi, and reviews detailed descriptions of them using a wireless network simulator and other programs and simulations. It uses the simulation model to select the characteristics of the network configuration and illustrate the nature of data transmission between nodes. This work also demonstrates the use of OMNeT++ to simulate the creation of a wireless network and secure data using encryption algorithms. Provides a brief overview of wireless network categories, defines wireless LAN networks, briefly discusses these technologies and devices, explains Wi-Fi, and reviews detailed descriptions of them using a wireless network simulator and other programs and simulations. It uses the simulation model to select the characteristics of the network configuration and illustrate the nature of data transmission between nodes.

Keywords: *OMNeT++, AODV, Wireless Network, Security, RC5 Algorithm.*

1. Introduction

The Mobile Ad - Hoc Network (MANET) is a network that can be created without central control. It consists of a group of nodes that send and receive data packets over a wireless interface. These network nodes can act as hosts and routers, sending packets on behalf of other nodes and running user applications from anywhere [1]. Emergency/rescue procedures, disaster relief, military coordination, home operations, and establishing a simple and effective communication system for smart devices in buildings are just some of the main examples of MANETs [2].

Developing the WANET simulation paradigm has been a difficult task due to its weak nature and limited bandwidth that limits wireless communication, receiving and sending messages. Customized network simulators and routing systems are prepared to meet various functions such as bandwidth performance, radio mode, speed convergence, reception, data protection, data loss and transmission pain [3].

Wireless Design Network describes the design and provides a comprehensive description of the simulations and software required for network implementation. Security measures are based on OMNeT++. OMNeT++ is a popular network simulation tool [4]. A network simulator is a software that models network activity without an actual network. The main tool for network simulation is OMNET++ that support multiple routing and queuing methods. OMNET++ is useful because it is useful for testing designs, checking feasibility of new systems, checking topology, checking data transmission, etc. A network simulator is an interactive network simulator commonly used in online identity research. In

addition to network security applications, it introduces the basic concepts behind network security and then discusses the theory of encryption and decryption and non-traditional encryption codes (block ciphers and stream ciphers) [6].

The remainder of this article is structured as follows: Section 2 provides an overview of the current application process. Section 3 shows the specific operation of the developed AODV. Section 3 describes the simulation environment configuration of the OMNET++ simulator. Section 4. Section 5 provides a description of the simulation results. Section 6 summarizes some findings.

1.1 Ad-Hoc On-Demand Distance Vector Routing Protocols

Routing in MANETs relies on many factors, including topology, router selection, and location of the request, to determine the route quickly and efficiently. Active and passive protocols are used to distinguish traditional routing technologies. This method does not take into account the power level of the network nodes. When routing is needed, reactive routing technology finds or manages it. This reduces the overhead of the measurement. The hop routing mechanism is called Ad Hoc On-Demand Distance Vector Routing (AODV) [7,8].

Ad hoc On-Demand Distance Vector (AODV) is a multi-hop, on-demand routing protocol for dynamic mobile wireless advertising, self-starting, and loopless hoc networks. AODV does not maintain a route cache, instead it operates on a table and looks for non-existent routes [9,10]. It allows the cell to respond quickly to changes in network topology and link Error Rate (RERR), Request Rate (RREQ), and Response rate (RREP). By using the code number, it only stores the current transaction at the time of use and eliminates the error process (not used) [11,12].

2. Methodology

2.1 Developed Algorithm

This article creates wireless networks using the RC5 algorithm, a parametric symmetric encryption. "Rivest Code" or "Ron's Code" stands for RC. The three RC5 parameters are the variance of the dimension (w), the variance of the variance (r), and the variance of the value (k). There are three options for size (w): 32, 64 and 128. The size can vary between 0 and 2040 pieces, and the number of turns can vary between 0 and 255 pieces. More importantly, the encryption and decryption units are the three modules that make up RC5. Using hardware is an option because, in general, the use of cryptography in software and hardware does not work according to the calculation speed. Three basic operations and their inverse operations are used in the RC5 algorithm. A. The addition and subtraction terms are modulo 2w, where w is the long term. B. XOR simply means bitwise OR. C. Rotation: The rotation of the word x resulting from the y bit is represented by the symbol x>>y. The given rotation depends on the range (RC5 includes rotation or dynamic rotation). The purpose of the RC5 algorithm is as follow:

(a). Fast (RC5 is a simple algorithm and word oriented, simple operation can be done on all word files at the same time).
(b). Switch to processors with different message lengths. (C). Simple (RC5 has a simple structure, is easy to use and simplifies the task of determining the strength of the algorithm.
(d). Change the length of the elements of the encryption keys (k) (0 -2040).
(e). Both hardware and software Applies to.
(f). Low requirements (this tool makes the algorithm suitable for smart cards and other devices with low memory).
(g). Symmetric block encryption.
(h). High security (Choosing the right price requires high security). (one). Variable number (r) (0-255).

The proposed algorithm is explained as follows. The steps involved are:

Algorithm 1: The developed Algorithm.

Step 1: The first stage is to gather the requirements. These are the necessities that the system needs to carry out the operation.
Step 2: The next stage is to import the INET file into a new dedicated workspace. In this stage, the projects in the INET file are being imported into the workspace.
Step 3 Once INET is imported, the next stage is to build the workspace by adding the necessary network files in the INET folder.
Step 4: The next stage is to design the network architecture. This is the way network services and devices are structured together to serve the connectivity needs of the program.
Step 5: The next stage is to setup the initialization file of the network. This is to setup the mobility configuration for all hosts.
Step 6: The next stage is the simulation execution stage. Simulation execution refers to the process of running a simulation program or software to generate results based on a given set of inputs or parameters.
Step 7 The next stage is to add some traffic to the network.
Step 8: Once the simulation is closed, an auto generated results folder will be created under the stated directory
Step 9: The next stage is the analyzation and observation stage. This is where the results generated are observed.

2.2 Simulation Setup

The event-driven simulation tool OMNeT++ (version 4.6) and the wireless extension of INET were used to run the simulations. The channel used is wireless channel / wireless physics, MAC protocol is 802.11, queue model is Drop Tail / Priority Queue, movement model is random waypoint model and propagation model is free space propagation model.

A 350 x 500 m2 area with five simulation nodes creates the simulation configuration. The speed difference between 1 MB/s and 5 MB/s is taken into account. Use a traffic location that uses constant rate (CBR) and a packet size of 1024 Mbit. Each simulation lasted a total of fifty seconds. The initial bandwidth of each node is set to 20MHz. The simulation parameters used are listed in Table 2.

Table 2: Simulation Parameters

PARAMETERS	VALUES
Area of simulation	(350X500) m
Nodes number	5
Type of routing protocol	AODV
Internet protocol type	TCP
Antenna model	Ideal Radio Medium
Max data packet	1024MB
Type of the MAC	802.11
Transmission speed	5Mbps
Bandwidth	20MHz
Security algorithm	RC5
Simulation time	50 seconds

3. Results and Discussion

According to research data, WANET achieved success in AODV. Simulations were performed to examine the performance of the AODV protocol. Performance evaluation is based on the following measurements

3.1 Radio Mode

This typically represents the operational state or mode of a wireless radio interference. It defines the behavior and characteristics of the radio such as transmission power, modulation scheme, coding scheme, channel access method and other.

3.2 *Reception State*

This refers to the condition or state of a wireless communication receiver in a simulation. It represents whether the receiver and decode incoming signals or whether it is unable to receive due to various factors such as interference, fading or being out of range.

3.3 Transmission State

This refers to the current operational status of a communication channel or inference. It indicated whether the channel is currently idle, transmitting data, or experiencing errors or interruptions.

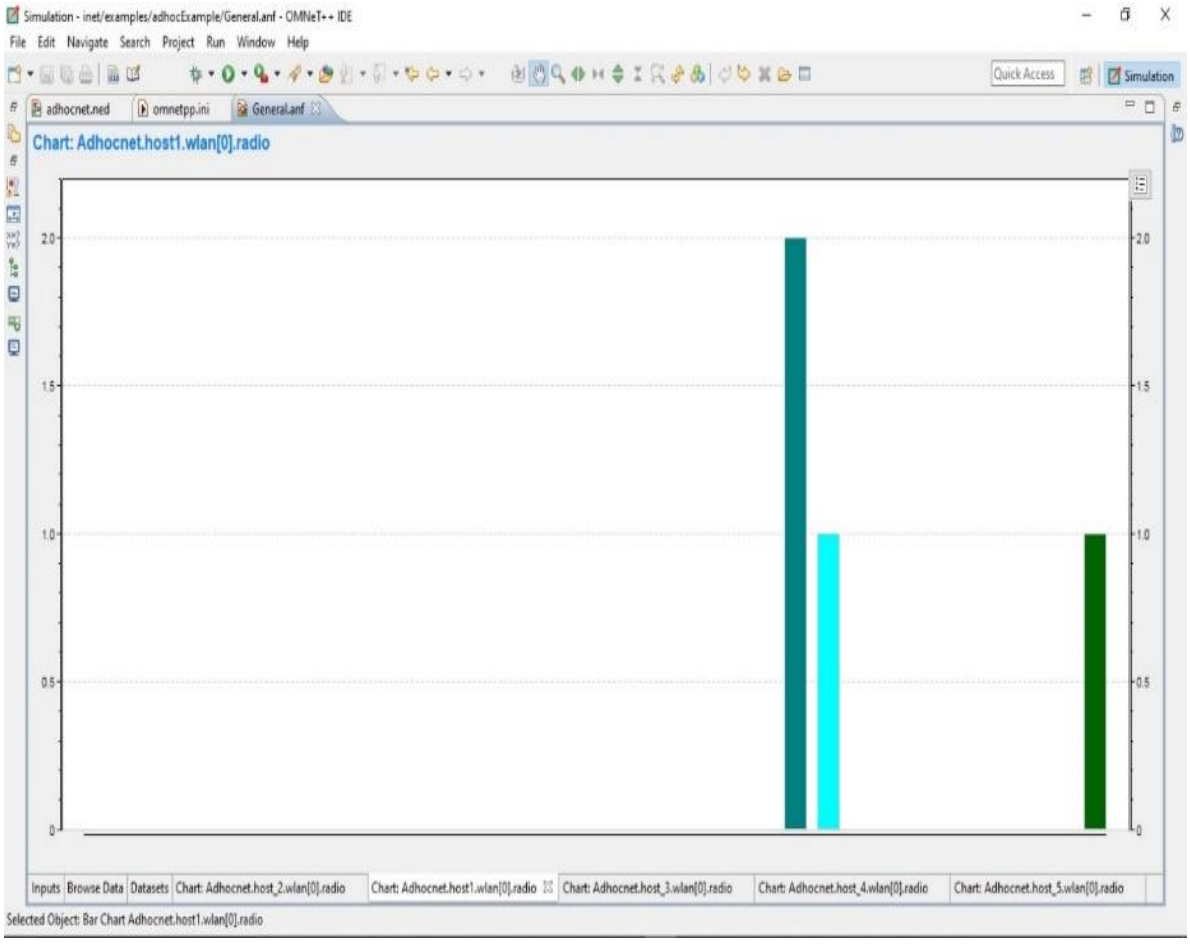

Figure 1: Result histogram for Host 1

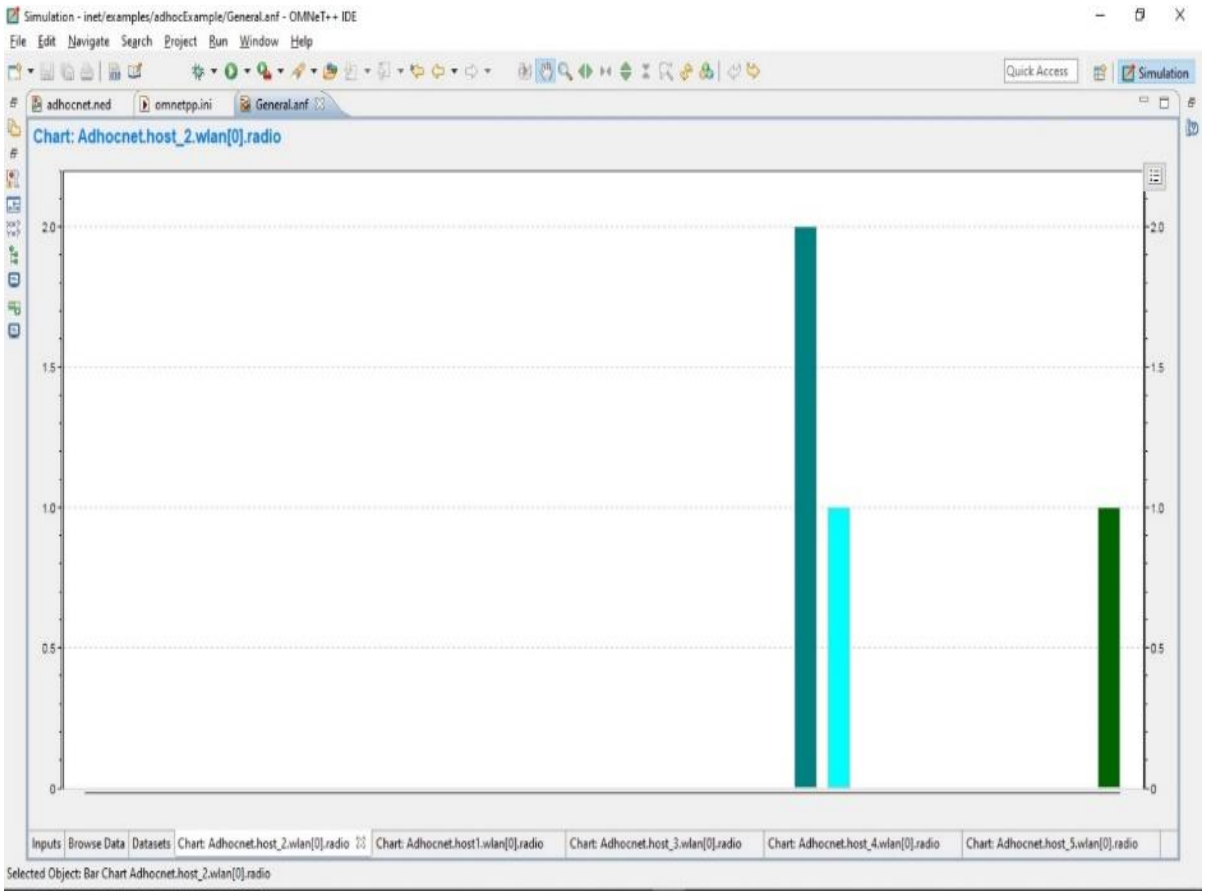

Figure 2: Result histogram for Host 2

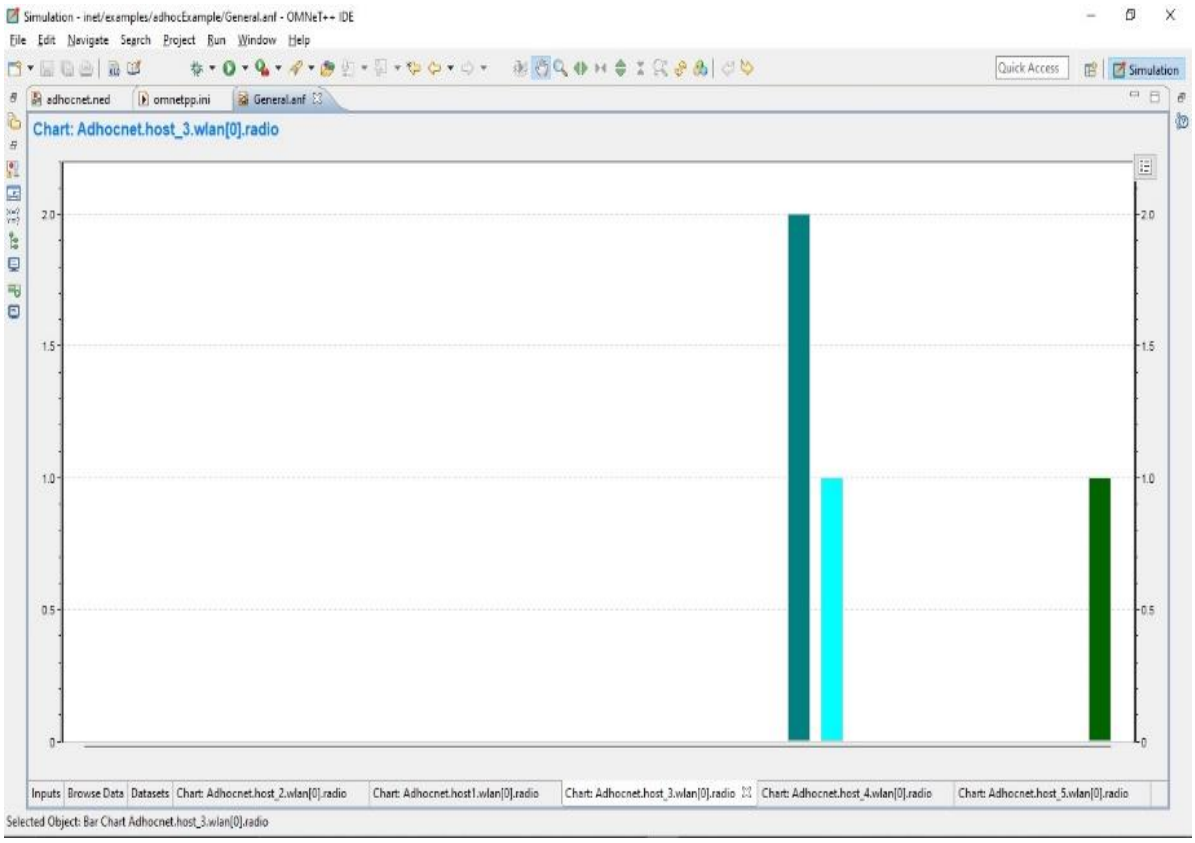

Figure 3: Result histogram for Host 3

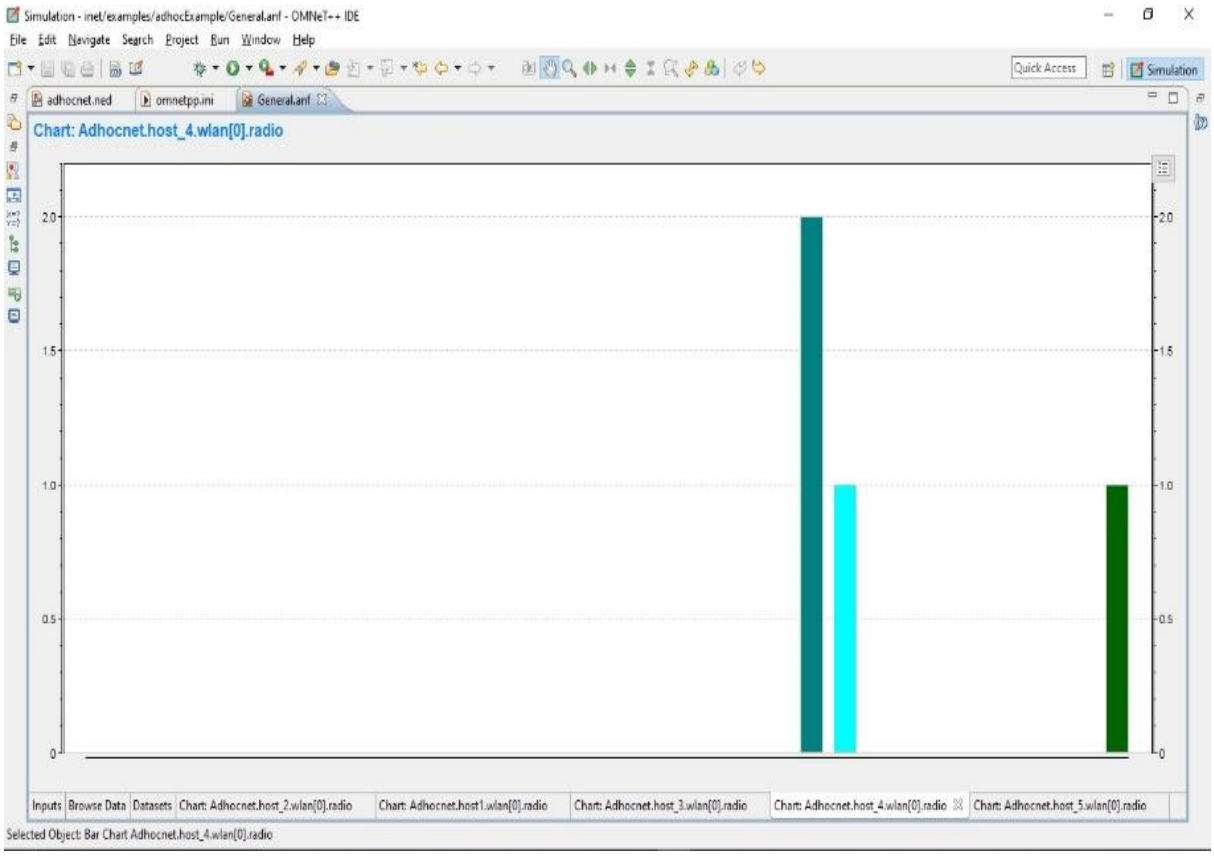

Figure 4: Result histogram for Host 4

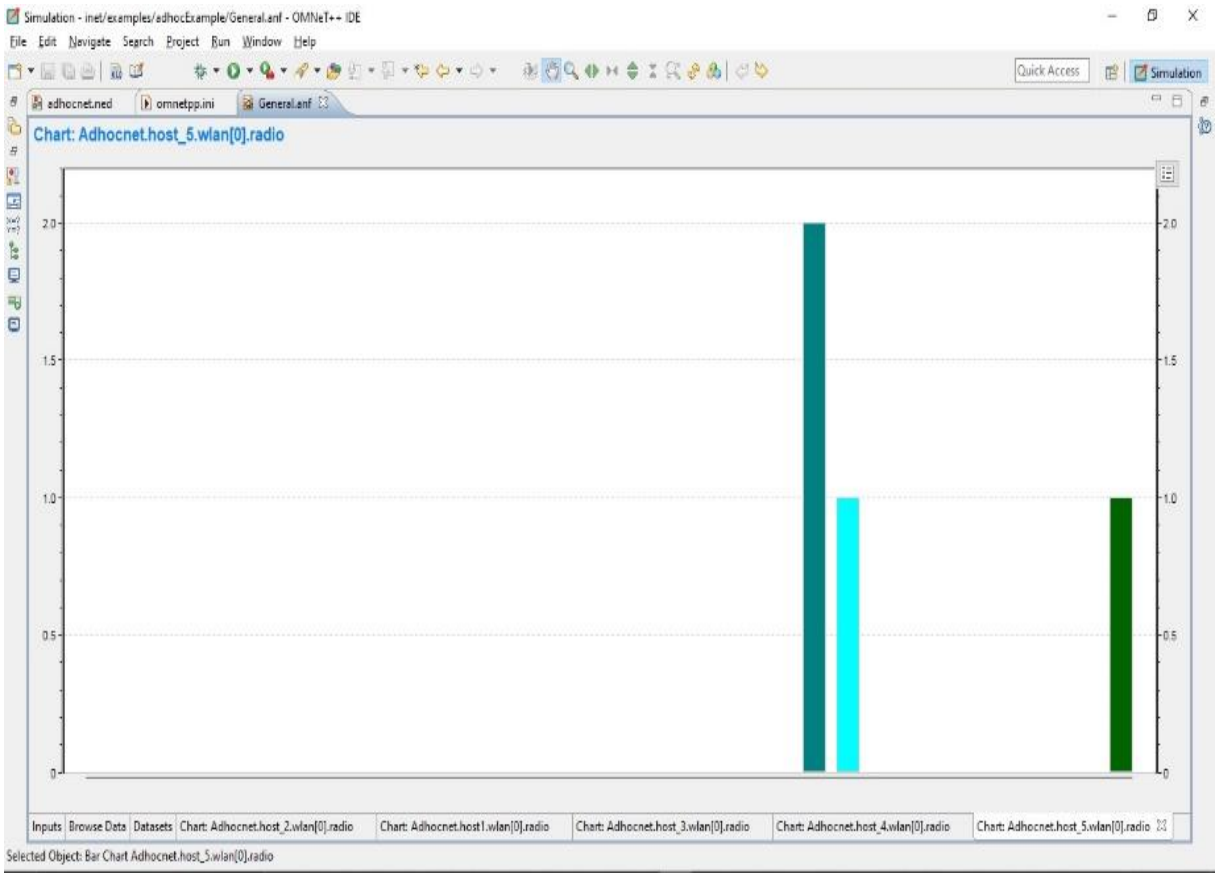

Figure 5: Result histogram for Host 5

4. Conclusions

In this paper, the software tool Objective Modular Network Testbed in C++, also referred to as OMNeT++, is reviewed and used for conducting simulations of specific illustrative examples of wireless ad hoc networks. In general, OMNeT++ provides users a way of specifying network protocols and simulating their behavior. The simulation results are presented.

1. The first step is to transfer information packages across nodes (in the event that there is only one way connectivity between hosts 1 and 5).

2. The second method is the use of the Cryptography Algorithm (RC5) to secure package transfer data during communication.

3. The third crucial component of the simulation is the use of a C++ program for security data and the TCL language for scenario scripting.

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The author(s) hereby declare that the work presented in this article is original and that any liability for claims relating to the content of this article will be borne by them.

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