

Design and Implementation 4G scenario on QualNet 5.0.2

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Abstract - Day by day wireless network communication is becoming more complex than previous days. In this time, the designing and testing is too much tough without any proper simulation software. In this stage, QualNet is that kind of simulator, where we can design a wireless and wired network systematically and we can also implement there LAN, cloud, switch, Wi-Fi, etc and simulate also. We can also detect & correction errors by this simulator. In this paper, we have described on a 4G scenario and it's results. Later we have a plan on modification of the network.

Key Words: LTE, QualNet, Wi-Fi, ITU-R, LAN

1. INTRODUCTION

1.1 About QualNet Software

QualNet [1] software is a tool for scientists, engineers and network planners to create virtual models of all types of data, voice and video networks. The models are comprised of nodes representing the network elements and endpoints (routers, switches, access points, ground stations, satellites, mobile phones, radios, sensors, PCs, servers, firewalls and other security equipment) and the links that interconnect the nodes (LAN segments, internet circuits, radio transmissions, Wi-Fi signals, LTE connections, etc.) The virtual network models are used by QualNet to simulate the behavior of the network under a wide variety of user-defined operating scenarios and application traffic patterns at faster-than-real-time speeds. Simulations can be federated with other simulation tools via HLA, DIS and socket interfaces. QualNet virtual network models deliver real-world fidelity, accuracy and precision. On this behalf qualnet provides heterogeneous wireless access facilities which are available on mobile terminals.

1.2 ADVANTAGES

QualNet has many types of advantages, basically it is a wireless network topology-

1. Multi-threading capabilities of multicore, cluster, multi and 64 bit processor system.

2. It has the ability for real time analysis to enable dynamic management.
3. Recombining different network.
4. It can design large user design network.
5. It enables the user to design new protocol models.

1.3. DISADVANTAGES

Beside advantages, there is also disadvantage,

1. QualNet is not a open source product so difficult for installation in linux & it is very expensive.

2. PROPOSED METHODOLOGY

In the software, we are trying to implement some graphical representation by using 4G, which is not possible in real field. That's why we are trying to implement it by using QualNet software to implement it for future. We have included here the 2D view (Fig:-1) & a 3D view (Fig:-2) of the scenario of this project.

A cloud is connected with the network system to increase the data speed.

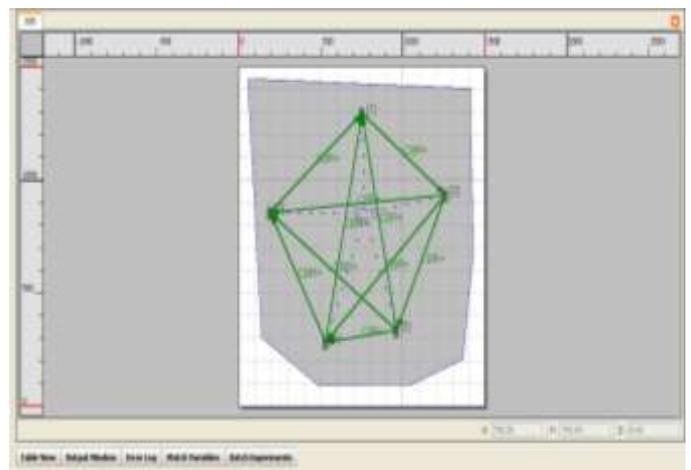


Fig1:- 4G network implementation in software

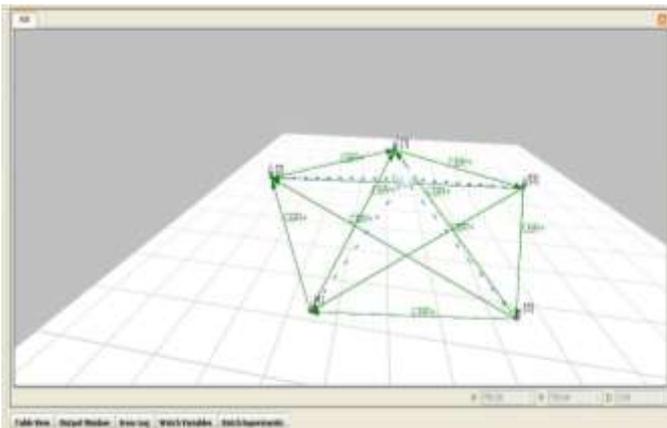


Fig2:- 3D view of the scenario

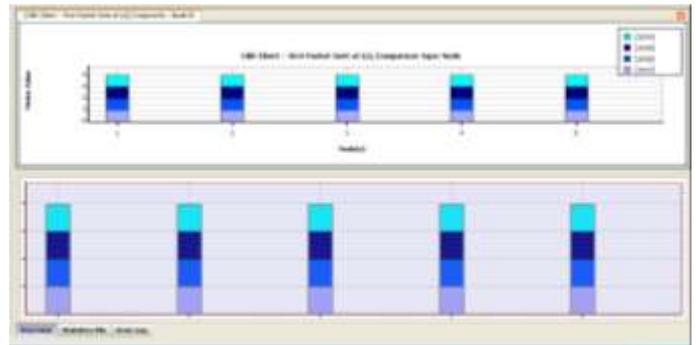


Fig3:- First packet sent

Last packet sent:- the parameter shows the first packet, which is sent to the nodes.

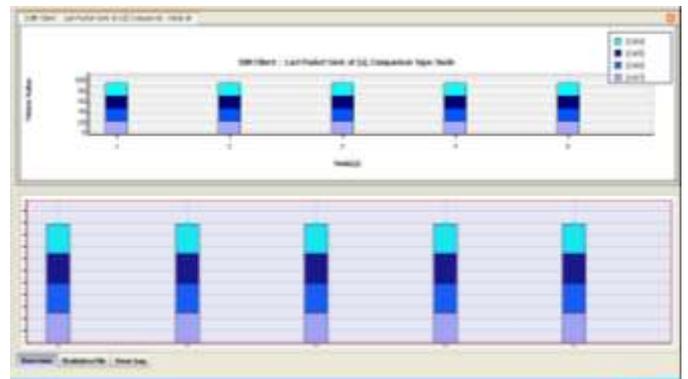


Fig4:- Last packet sent

In through bit/sec graph, Matric value is 16000

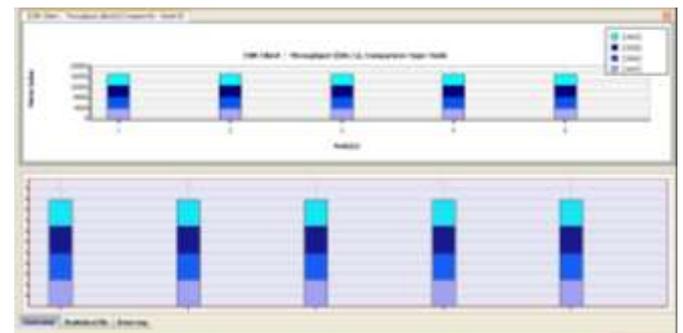


Fig 5:- Through bits/sec graph

Result in Bellman-Ford [3];

Number of periodic updates graph, Matric value is 3;-

3. RESULT

We checked the results in CBR [2] traffic mode & got the results as following.

Simulation parameters	Values
No. of nodes	5
Area	1500*1500
Simulation time	30 sec.
Traffic mode	CBR
Total byte sent [1024]	12500
Total packet sent [1024]	24
Throughput [1024]	4400 (bits/sec)

Total bytes sent:- The parameter shows, how much bytes are sent to the nodes.

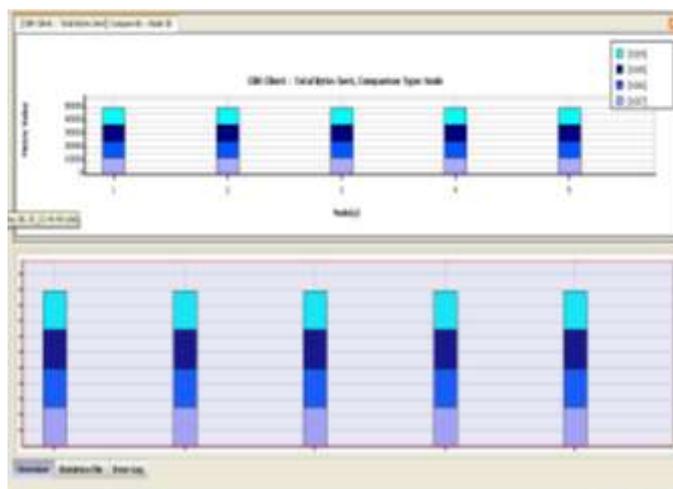


Fig3:- Total bytes sent

First packets sent:- The parameter shows, how much packets are sent to the nodes.



Fig 6:- Number of periodic updates sent

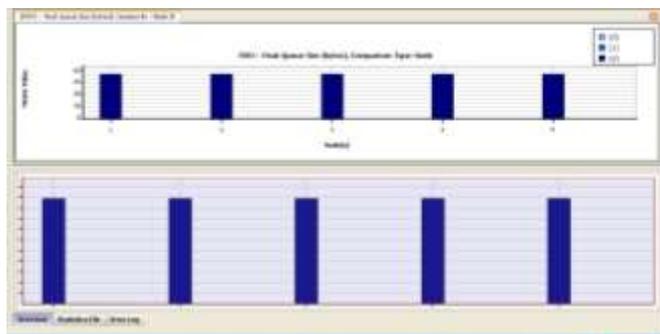


Fig 7:- Size of peak queue



Fig 8:- Packets for application

3. CONCLUSIONS

Fourth Generation (4G) systems, in addition to the usual voice and other services of Third Generation (3G), provides mobile ultra-broadband Internet access. Worldwide Interoperability for Microwave Access (WiMAX) forum promises to offer high data rate over large areas to a large number of users where broadband is unavailable. This paper focuses on routing in fourth generation wireless networks along with a brief study on layer three routing protocols. To this end, a wireless network scenario is simulated and their key features are exposed using QualNet Network Simulator.

QualNet is a commercial software that runs on all common platforms (Linux, Windows, Solaris, OS X) and is

specialized in simulating all kind of wireless applications. It has a quite clear user interface compared to other solutions while also offering an easy to use command line interface.

We conclude that these are the major application of QualNet:-

- Network design and architecture optimization.
- Capacity prediction and Mission planning.
- Protocol and waveform technology research issue.
- Propagation modeling and RF interference.
- Disaster response preparation system.
- Hardware and software development.

Without having compared QualNet to other similar solutions various advantages became apparent while using it. The most important ones are easy-to-use and clear UI. It has wide range of possible applications. It's support for multiprocessor systems and distributed computing and sophisticated animation capabilities. It has extensive possibilities for analyzing scenario. There're some disadvantages as well:

- Difficult in installation on Linux.
- Slow Java-based UI

FTURE SCOPE

We have to do:

- Design new protocol models [4]
- Optimize new and existing models
- Try to find out the cause of disadvantages & try to solve the problems also.
- Modification of the network also.

ACKNOWLEDGEMENT

We took opportunity to express my earnest gratitude & sincerest thanks to our departmental faculties for giving the most valuable suggestion, co-operative guidance & inspiration for this paper work.

We are also thankful to our group member also.

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