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Performance Comparison of Ad Hoc on Demand
Distance Vector (AODV) and Dynamic MANET
On-Demand (DYMO) Routing Protocols

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Abstract

Mobile Ad hoc Networks (MANET) is a new communication model that enables the communication between hosts moving on the network without fixed infrastructure, this has opened door to develop several new user applications.

One of the major challenges in wireless ad hoc network is the design of robust routing protocols. The routing protocols are designed basically to established correct and efficient paths between source and destination.

This thesis present performance comparison of two mobile ad-hoc network routing protocols (AODV and DYMO) using OMNET++ 4.3. The performance analysis is based on different network metrics, throughput (bit per second), end-to-end delay (per second), and average jitter(per second).

Performance of each routing protocol has been analyzed and evaluated accordingly based on different number of hosts (10, 20 and 30) and with simulation time 360 seconds.

The results show that DYMO is a better routing protocol than AODV routing protocol for Mobile Ad hoc Network with respect to performance metrics, end to end delay and jitter, but AODV routing protocol performs better with respect to throughput this is due to the fact that the DYMO protocol does not support sending HELLO messages.

المستخلص

شبكات الهاتف اللاسلكية الخاصة (Wireless Ad Hoc Network) هي نموذج إتصالات جديد يسمح لأجهزة الهاتف المحمول للإتصال فيما بينها دون الحاجة لوجود بنىات تحتية , مما يسمح بتطوير العديد من تطبيقات المستخدم , وتعتبر بروتوكولات التوجيه من المقومات الأساسية في شبكات الهاتف اللاسلكية , يتم تصميم بروتوكولات التوجيه لتأسيس مسارات صحيحة وفعالة بين المرسل والمستقبل.

في هذا البحث تمت مقارنة الاداء بين اثنين من أهم البروتوكولات المستخدمة في توجيه الحزم للشبكات اللاسلكية الخاصة وهما AODV و DYMO بإستخدام برنامج المحاكاة OMNET++4.3 , وتم تحليل الاداء بإستخدام معايير تقييم مختلفة وهي الإنتاجية أو عدد الحزم التي تم توصيلها للمستقبل (بت/ثانية), زمن التأخير في إرسال الحزم من المرسل إلى المستقبل (ثانية) , الإختلاف في أزمدة وصول الحزم (ثانية).

تم تقييم وتحليل أداء كل بروتوكول بناءً على اعداد مختلفة للأجهزة داخل الشبكة وهي (٣٠,٢٠,١٠) جهاز على التوالي وبزمن محاكاة ثابت وهو ٣٦٠ ثانية . ومن نتائج المحاكاة وجدنا ان بروتوكول التوجيه DYMO أفضل اداءً من بروتوكول AODV في الشبكات اللاسلكية وذلك اعتماداً على معايير محددة للاداء وهي زمن التأخير والإختلاف في أزمدة الوصول , أما الإنتاجية فان بروتوكول AODV أفضل من بروتوكول DYMO وذلك لان بروتوكول DYMO لا يدعم ارسال HELLO Messages كما في بروتوكول AODV.

1.1 Introduction:

Wireless Ad Hoc network is a new wireless communication mode without fixed infrastructure, and each mobile node has both the function of router and the function of host computer, and all nodes are mobile and dynamically link with other nodes.

Ad hoc wireless network must be capable to self-organize and self-configure due to the fact that the mobile structure is changing all the time. Mobile hosts have a limited range and sending the message to another host, which is in the sender's host transmission range, by forwarding through the network using other hosts which will be operated as routers for delivering the message throughout the network.

Many routing protocols have been proposed for the mobile ad hoc network and classified as Proactive and Reactive Routing Protocols, these routing protocols should be capable to handle a very large number of hosts with limited resources, such as bandwidth and energy.

1.2 Research Problem:

There are several MANET routing protocols, with competing features, developed for wireless ad hoc networks. These protocols have varying qualities, thus choice of a correct routing protocol is critical.

This thesis study main question, that which routing protocol between AODV and DYMO provides better performance in Mobile Ad hoc Networks?

1.2 Research Objectives:

The objectives of this thesis is to compare the performance of (AODV and DYMO) routing protocols for wireless ad hoc networks based on performance.

1.4 Research Methodology:

We used an open source simulator (OMNET++) to compare the performance of two routing protocols (AODV and DYMO). The performance of two routing protocols is compared based on the throughput, end to end delay and jitter.

To study the performance of the two protocols under different situations, we considered three scenarios based on the number of nodes in the network, the number of nodes in the first, second and third scenario is 10, 20 and 30 respectively.

The simulation run for 360 seconds, to get an accurate result the experiment was repeated for each scenario five times and take the average.

1.5 Research Outlines:

This thesis is divided into five main chapters. Chapter two presents the background and the basic classification of MANET's routing protocols and brief insight into related work.

Chapter three presents the simulation software that used and the steps to run the experiments; it also includes the performance metrics to compare between the routing protocols.

Chapter four presents the simulation scenarios used in our experiments, it consists of three scenarios to compare the

performance of the AODV and DYMO routing protocols, and shows the analysis and results of the simulation.

Chapter five presents the conclusion and recommendations for future work of this research.

