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PERFORMANCE EVALUATION OF PROACTIVE PROTOCOL (AODV) AND REACTIVE PROTOCOL (WRP) FOR MANET UNDER FREE SPACE AND TWO RAY PROPAGATION MODEL

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ABSTRACT

MANET is self Configuring, without any infrastructure, network of mobile devices where each mobile device connected to network without any wire. And in Mobile ad hoc network each device work as a router . Performance of MANET is always affected by the two things mainly routing protocols and Radio Propagation Modal then in this paper the Performance of two MANET protocols namely proactive protocol i.e. wireless routing protocol (WRP) and Reactive protocol i.e. ad hoc on-demand distance vector (AODV) is evaluated for Free space and two ray propagation model. The GloMoSim Simulator used for simulation purpose. The performance analysis is based on different values of two scenarios No of Nodes, Radio Ranges in the network and two different Performance metrics such as Loss Packet Percentage, Average Throughput used for it. It is evaluated that AODV is more suitable than WRP in both measured metrics under the free space radio propagation model. The AODV is thus a better protocol for MANETs as compared to WRP. The same simulation platform could be used test other protocol.

Keywords: AODV, GLOMOSIM, MANET, WRP

I. INTRODUCTION

A MANET is a group of various mobile devices that form a dynamic infrastructure-less communication network wherever it is required. Due to Low cost, quick and easy establishment of such networks make them useful to use in military, disaster area recovery and in other environments where no infrastructure exists. Routing is very important feature as well as a difficult and challenging task in that type of network due to highly dynamic environment because each mobile node may move in any directions, which can cause break the existing links and the establishment of new routes. The various mobility models that uses the mobile nodes, in mobile ad-hoc network and Random way point used mainly. Here we analyzing how a protocol performs under a certain environment, the drawbacks of the protocol could be discovered and more research could be done on removing those drawbacks. However, in this paper we make comparison mainly in between two protocols in specific

scenarios under the two Radio propagation Model in MANET in order to help in choosing the best protocol suited to best model in particular conditions .In this paper Glomosim is a commonly used tool for MANET's protocol evaluation.

II. ROUTING PROTOCOL

Routing is the process by which a path is selected by nodes in a network along which they send data packets. A routing protocol is a standard, which decides how a data packet routes b/w source to destination.

Types of Routing Protocols in MANET

Routing protocols are classified into three categories such as Proactive, Reactive and Hybrid

2.1 Proactive /Table driven Protocols

Packets are send from source node to destination node on a route the which is specified in the routing table. In this strategy, the packet is transferred as fast as possible but the routing efforts is greater because all the routes have to be defined before transferring the packets In Proactive protocols the route for all the nodes is specified in routing table. Example protocols: DSDV, OLSR, WRP

2.2 Reactive Protocols/On Demand Protocols

In these the routes are not defined before routing. A route is settled only when it is needed. So no the table-driven procedure is used .Example Protocols: DSR, AODV.

2.3 Hybrid Protocols

Hybrid protocols are the fusion of both reactive and proactive protocols. They take benefits from both types of these protocols. Example Protocol: ZRP.

III. SUMMARIZATION OF ROUTING PROTOCOL AODV AND WRP

3.1 WRP: Wireless Routing Protocol

WRP is a table-Driven protocol and also an improved form of DSDV Protocol and also used the Bellman ford Algorithm to Calculate paths .it differs from DSDV from table Maintance Feature. The WRP protocol also ensures from loops freedom and it avoids Short lived routing loops by using the predecessor information. In WRP each node requires to maintain four type routing tables. : (a) Distance table contains the information about the neighbors of a node. (b) Routing table contains the newly information of the network for all known destinations. It tells the shortest distance, the ancestor node, the successor node, and a flag indicating the status of the path. (c) Link-cost table contains the cost means no of nodes to reach at destination, of carrying messages through each link. The cost of a broken link is infinity and this is used to detect link breaks. (d) Message retransmission list table. The MRL keeps an serial number of every update message, a retransmission counter and a list of updates in a update message .Nodes inform to each other about the link changes using update

message. Therefore each node needed a significant amount of memory for this purpose then the size of the network increases.

3.2 AODV: Ad hoc On-Demand Distance Vector (AODV)

It is a routing protocol for mobile ad hoc networks (MANET) and other wireless ad hoc networks. It was jointly developed on July 2003 in Nokia Research Center, University of California E. Belding-Royer and S. Das. In this the route from source to destination is firstly detected and being set up when demanded. When a source node wishes to send a message to a destination node then it starts a Path Discovery process to locate the Destination node. For this it widespread a route request (RREQ) packet to all its nearby nodes, which then forward the request to their nearby nodes , and so on, until the destination node is located. AODV uses the destination sequence numbers to contain the most fresh route information. Intermediate nodes can reply to the RREQ only when they have a route to the destination. The source node initially increment the RREQ ID one then send the RREQ message and in this way, each RREQ message is uniquely identified by combining the above numbers with the source IP address. Any intermediate node that receives an RREQ message performs one of the following three functions: Firstly, the intermediate node rejects the RREQ message if it has already received the same RREQ message. If the intermediate node has a appropriate route to the destination node then it reply by a RREP message back to the source node. But Intermediate node also use of periodic HELLO messages from a node to maintain connectivity with its nearby nodes then bandwidth consumption is high.

3.3 RADIO PROPAGATION MODEL

Radio propagation model are tells about the characterization of radio wave propagation. These models are created with the goal of formalizing the way, radio waves are propagated from one place to another, such models typically predict the path loss along a link or the effective coverage area of a transmitter. And Radio waves are affected by various factors like reflection, refraction, diffraction.

3.3.1 Free space model

The free space model states that in the ideal propagation condition between the source and the destination there is only one clear line of slight (LOS) path In the free space model there is only one clear line of slight (LOS) path or way in between of the transmitter and the receiver.

3.3.2 Two-Ray Ground Model

In free space model there is only one single direct line of path. But signal attain the receiver through multiple paths (due to reflection, refraction and scattering).The two-ray model attempts to cover this phenomenon. We can say that, in this model signal reaches the receiver via true paths: a line-of-slight path and a path through which the reflected wave is received

IV. RESARCH METHODOLOGY

The Glomosim Simulator is used for performance evaluation of Proactive (WRP) and Reactive (AODV) Routing Protocol of radio propagation model (Free space, Two Ray) in MANET. Results are evaluated on the

basis of two performance metrics such as Loss packet Percentage and Average Throughput using GlomoSim simulator. Performance of both protocols is evaluated for two different scenario Radio Ranges and No. of nodes and for Model Free Space and Two Ray. GloMoSim is designed using the parallel discrete event simulation capability provided by Parsec, a parallel programming language. GloMoSim recently handles protocols for a wireless network. Glomosim uses the Parsec compiler for compile the protocols. Parsec is a C-based simulation language. GloMoSim simulator simulates more than thousand nodes in the network.

4.1 Simulation Parameters

An environment size of 1500m x 1500m2 has been taken in our simulation. The simulation is run over 500s.And CBR data Session is used .The network parameter taken in our simulation is shown in the Table given below.

Parameter	Value
Radio propagation Model	Free Space, Two Ray
Mobility Model	RANDOM-WAYPOINT
Routing Protocol	AODV,WRP
Channel type	Wireless
No.of Nodes	15,30,45,60,75,90
Radio Ranges	50,100,150,200,250,300,350,400,500,550,600
Traffic Type	CBR
MAC Protocol	IEEE 802.11
Radio Type	Accumulated Noise Model

TABLE 1.Simulation Parameters

4.2. Network Scenarios

4.2.1. Number of Node

Number of Node means the no. of nodes placed in networks. For this reason, we have varied a number of nodes. Six cases were considered: 15, 30, and 45, 60, 75, 90 nodes. For the time being, let's the nodes' maximal and minimal speed at 30 m sec-1.

4.2.2. Radio Range

The transmission power is expressed in dbm in the configuration file of Glomosim this makes it somewhat difficult to get an idea of the transmission range in meters. Therefore a program called radio range is shipped with the GloMoSim environment to get the radio range. Twelve cases are considered 50, 100, 150, 200, 250, 300, 350, 400, 450, 500, 550, 600 and that time speed is constant 30m/s and also pause time 30m/s .and shows the effect of radio range on two performance metrics

4.3 Performance Metrics

4.3.1. Loss Packet Percentage

The number of data packets that are not successfully sent to the destination. Usually these packets get dropped before the destination can be reached. A network should work to attain less LPP in order to have a better performance.

4.3.2. Average Throughput

is the way of measurement how fast we can actually send data source to destination in the network. It is the volume of number of packets that are transmitted through the network in a unit of time. It is always adorable to have a network with high throughput. We can say that how soon any user received the data.

4.4 SIMULATION RESULTS AND ANALYSIS

Analysis of protocols and two Radio Propagation model is done on the basis of simulation results. Glomosim Simulator is used for this purpose .Simulation is done for two scenarios that are no of node, Radio Range , two performance metrics that are loss packet percentage ,average throughput. Conclusion is made on the basis of these outputs of two performance metrics in two different scenarios.

4.4.1 Simulation Results for Model Free Space

Results for Scenario 1:

Graph1: Loss Packet Percentage in variation of No. of Node

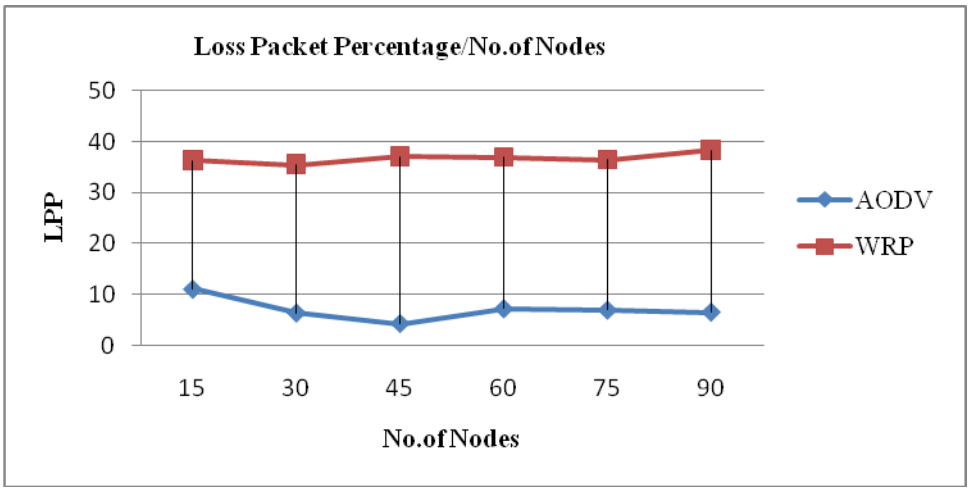
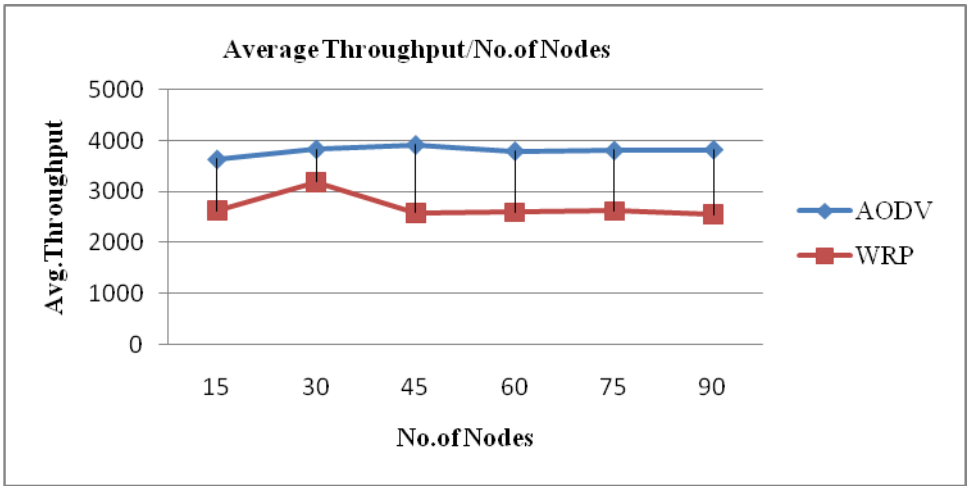


Fig 1: No of Node vs. LPP

Fig1.shows that as the no of node increases then LPP is less in AODV than WRP thus AODV gives better performance than WRP. Because packets loss is almost Four times more in WRP

Graph2: Average Throughput in variation No. of Nodes



. Fig 2: No of Node vs. Avg. Throughput

Fig 2 Shows that as the no. of nodes increases than Average throughput is more in AODV thus AODV gives better throughput than WRP, because more packets reach its destination than WRP.

Results for Scenario 2

Graph 3: Loss Packet Percentage in variation of Radio Range

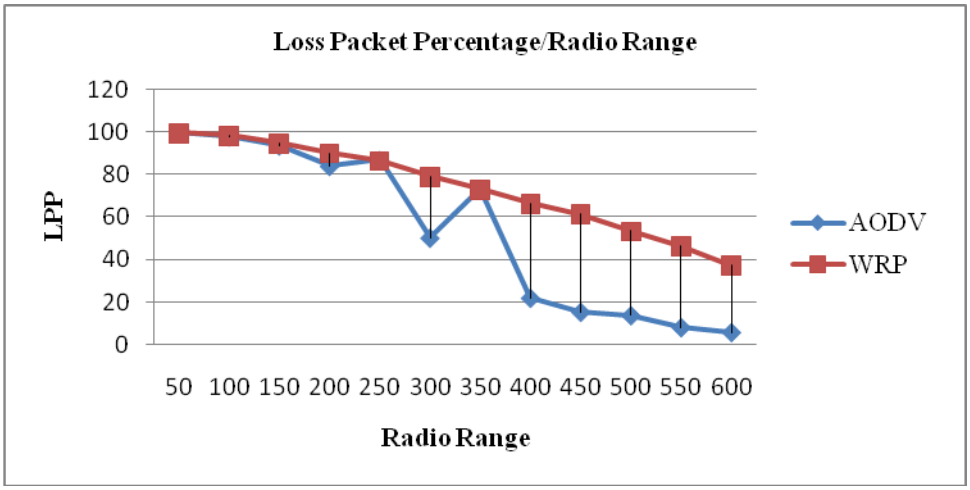


Fig 3: Radio Range Vs.LPP

Fig 3 shows that as the Radio Range Increases, AODV performs better than WRP. Because less packets loss in AODV than WRP

Graph 4: Average Throughput in variation of Radio Range

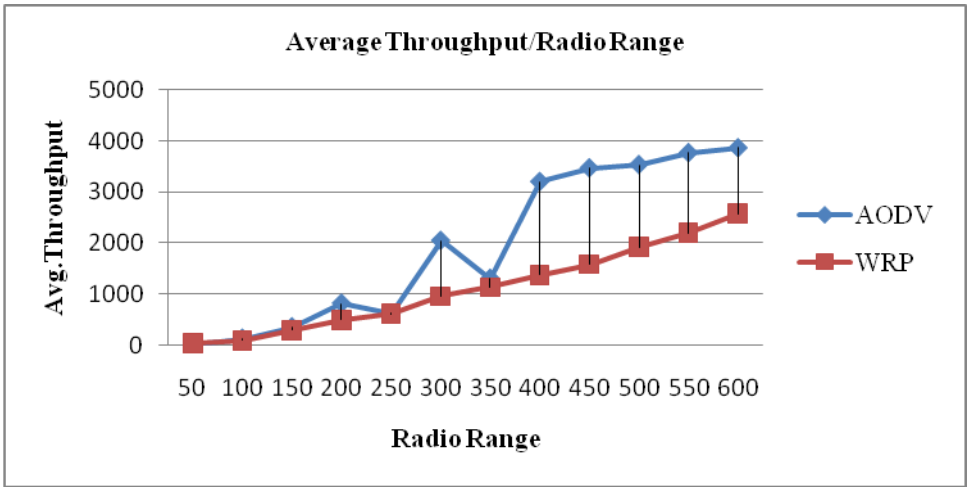


Fig 4: Radio Range versus Avg. Throughput

Fig 4 shows that as Radio Range increases Average Throughput is more in AODV than WRP then AODV gives better performance than WRP because more packets is delivered in AODV

4.4.2 Simulation results for Model Two Ray

Results for Scenario 1

Graph 5: Loss Packet Percentage in variation of No. of Nodes

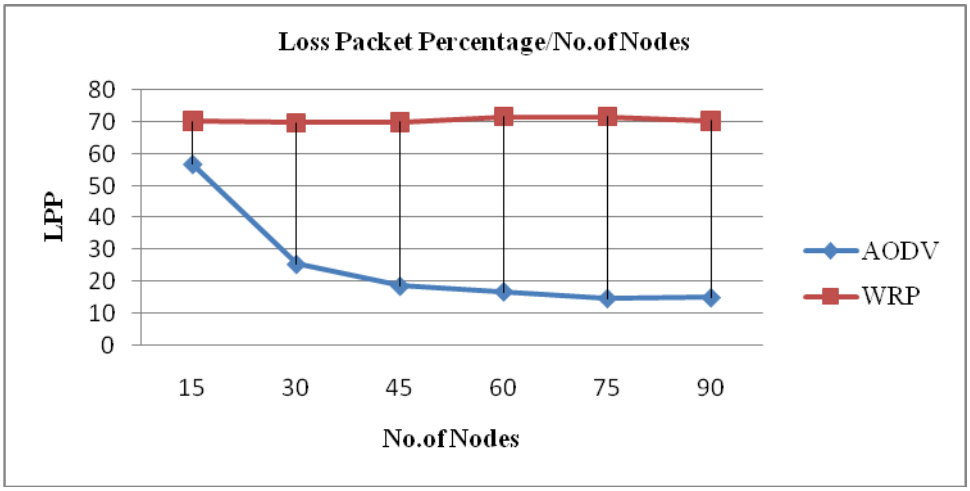


Fig 5: Radio Range versus Avg. Throughput

Fig.5 shows that as no of node increases LPP are less in AODV thus AODV is more valuable than WRP due to less packet loss.

Graph 6: Average Throughput in variation of No. of Node

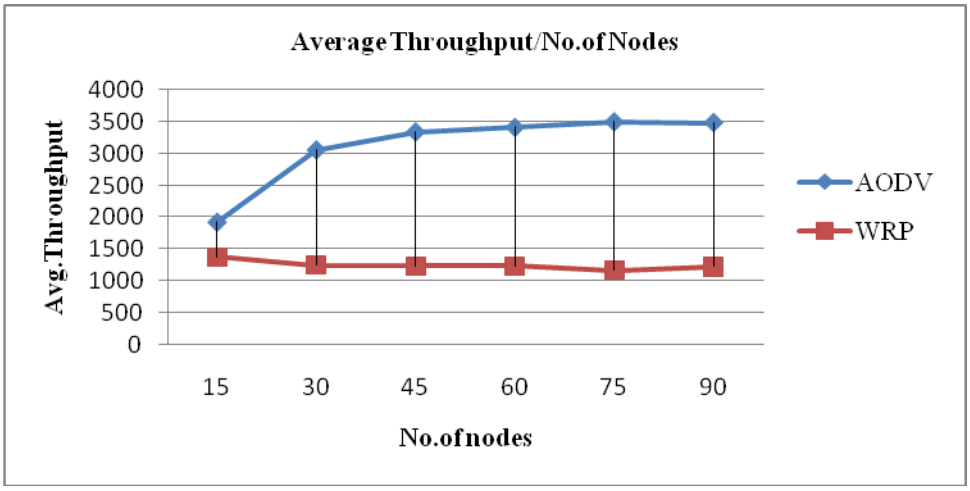


Fig 6: No of Node vs. Avg. Throughput

Fig 6 shows as no of node increases in AODV more packets are successfully reach its destination than WRP. Then AODV gives better throughput than WRP.

Results for Scenario 2 for model Two Ray

Graph 7: Loss Packet Percentage in variation of Radio Range

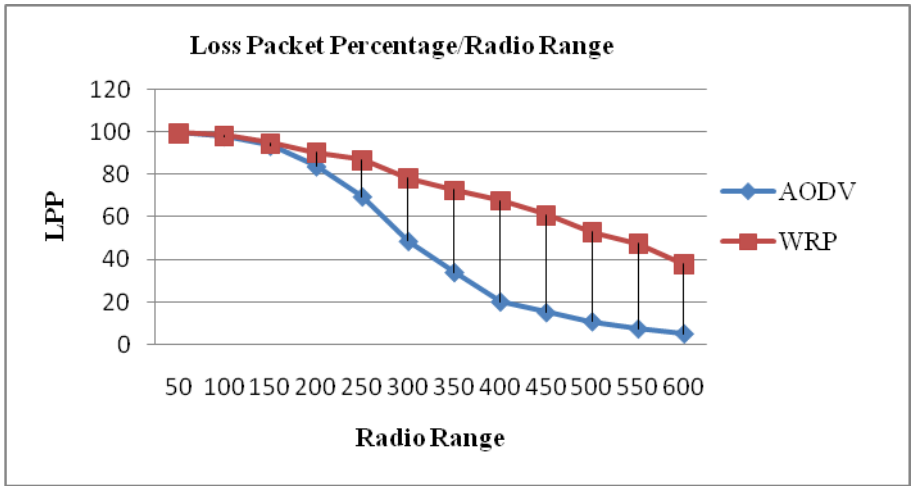


Fig 7: Radio Range vs. LPP

The Fig.7 shows that as the Radio Range increases, LPP is less in AODV than WRP. Then AODV more suitable than WRP, because less packets loss in AODV than WRP.

Graph 8: Average throughput in changes of Radio Range

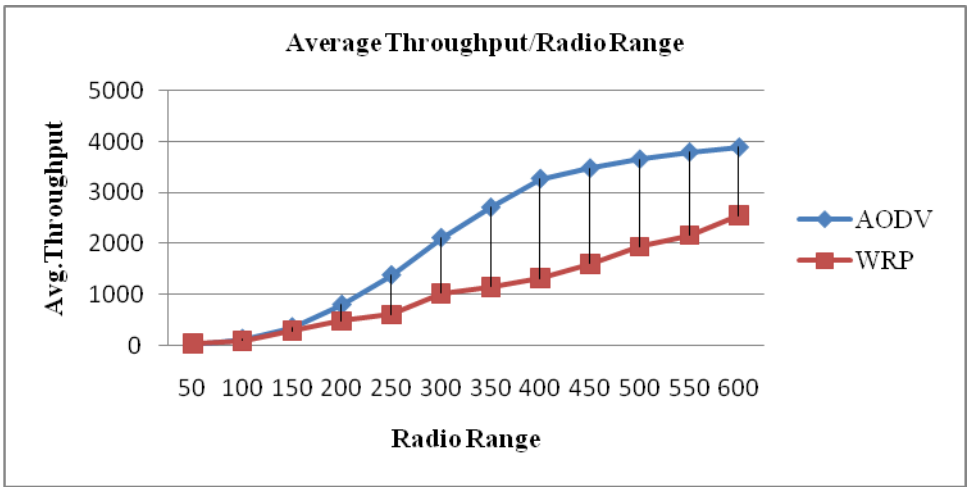


Fig 8 Radio Range Vs Avg. Throughput

Fig 8 shows that AODV more suitable than WRP because more packets is successfully delivered in AODV than WR**P**

V. CONCLUSION FOR MODEL FREE SPACE

In case of model Free Space ,when we increases the values of No of node, and Radio range then AODV more suitable than WRP means AODV gives the better output for Average Throughput and Loss Packet percentage. Because packets loss is less, and Average throughput is more in AODV

5.1 Conclusion for Model Two Ray

In case of model two ray , when we increases the values of No of node, and Radio range then AODV more suitable than WRP means AODV gives the better output for Average Throughput and Loss Packet percentage. Because packets loss is less, and Average throughput is more in AODV

5.3 Overall Conclusion for both Models

In the performance evaluation of protocols AODV and WRP on basis of two Scenario No of nodes, Radio Range and performance metrics Loss packet Percentage, Average Throughput then we conclude that AODV performed better WRP , And we analysis AODV performed better with which model then we conclude from Analysis AODV performed better under the Model Free space in Scenario 1 than Two ray .but in case of Scenario 2, Radio range ,Two ray model performed almost equal to Free space or little bit performed better than Free Space So, we can observe that if the MANET has to be organized for a small amount of time then AODV should be prefer due to low initial packet loss and if we compare the both radio propagation models two ray and free space ,AODV is better performed with free space model than Two Ray Model.

5.4 Future Scope

In Future We can also compare other routing protocol like DSR, DSDV with using these Same scenarios and compare the other Radio Propagation modes as well compare all Propagation Models

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