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RESEARCH ARTICLE

IEEE 802.11b based Investigation and Simulation Evaluation of MANET TORA Routing Protocol using on Different QoS

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Abstract

Mobile Ad-Hoc network (MANET) is a network of mobile nodes that can communicate with each other without using any centralized control or fixed infrastructure .This paper using OPNET simulation tool for the performance of TORA routing protocol simulation, build a small scale the complexity of the mobile Ad-Hoc network model, the TORA routing algorithm, the average Total traffic sent and received in packet and bit per second form, MAC delay, network coverage activity and duration, number of hops, Load in scenario for the simulation analysis and performances. The simulation result of the research has practical reference value for further study.

KEYWORDS- MANET, Reactive protocols, TORA, OPNET

INTRODUCTION

Ad-Hoc networks (MANETs) have no infrastructure that is all the mobile nodes in MANET are free to join and left the network anytime as per their requirements. The nodes are connected with each other through a wireless link. A node can serve as a router to forward the data to the neighbors' nodes. Therefore this kind of network is also known as infrastructure less networks [1]. These networks have no centralized administration. Ad-Hoc networks have the capabilities to handle any malfunctioning in the nodes or any changes that its experience due to topology changes. Whenever a node in the network is down or leaves the network that causes the breaking of links between other nodes [2] then the affected nodes in the network simply request for new routes and new links are established.

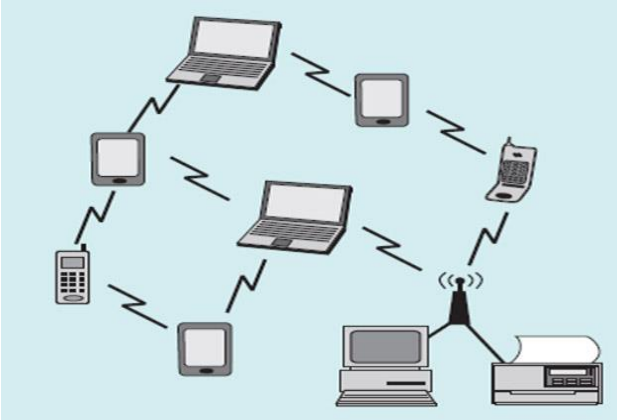

Fig 1. Mobile ad-hoc network

Several routing protocols have been suggested and used for MANET. Dynamic Source Routing (DSR), Ad Hoc On-Demand Distance Vector Routing (AODV) and Destination Sequenced Distance-Vector (DSDV) have been implemented.

TORA

Temporally ordered routing algorithm (TORA) is a reactive routing protocol, which is also known as link reversal protocol. It is effective in solving the existing limitations of MANETs. Due to the high mobility of nodes, congestion is one of the major problems in MANETs. Traditional shortest path algorithm, adaptive shortest path algorithm, and link state routing cannot work properly in mobile networks. It is difficult to update the routing tables of dynamic nodes. In TORA, each node broadcasts a query packet and the recipients broadcast an update packet. It supports the loop-free, multiple route facilities. Using "flat" non-hierarchical routing algorithm, it also provides better scalability. To discover a new route, it uses the directed acyclic graph (DAG) algorithm and also uses a set of totally ordered height values at all times. In this approach, information may flows only in one direction [9]. Hence it is only unidirectional; there is no chance to fall in an infinite loop. It performs four basic operations which are route creation, route maintenance, route deletion, and optimizing routes [10].

OPNET MODELER

OPNET Modeler is a commercial research oriented network simulation environment tool for network modeling and simulation. It allows the users to design and study communication networks with proper flexibility and scalability. It simulates the network graphically and gives the graphical structure of actual networks and network components. The users can design the network model visually [8]. In this paper, the network simulations are implemented using OPNET modeler (version 14.5).

MODEL DESCRIPTION

In this paper we have evaluated performance of MANET using TORA routing protocol by considering FTP application type and IEEE 802.11b WLAN Standards in two scenarios. In first scenario we have taken 50 mobile nodes and in second scenario 100 mobile nodes and in both scenarios IEEE 802.11b standards are considered to simulate the environment and evaluate the performance of MANET. Thus, in total we ran two scenarios. Two scenarios ran for IEEE 802.11b WLAN Standard, one for 100 nodes and other for 50 nodes. Each scenario was simulated for 3600 seconds. After successful completion of the simulations, results are selected according to the problem solution. Results are collected in the form of graphs, with overlaid data displaying.

Fig. 2 shows the simulation environment of one scenario containing 100 WLAN mobile nodes.

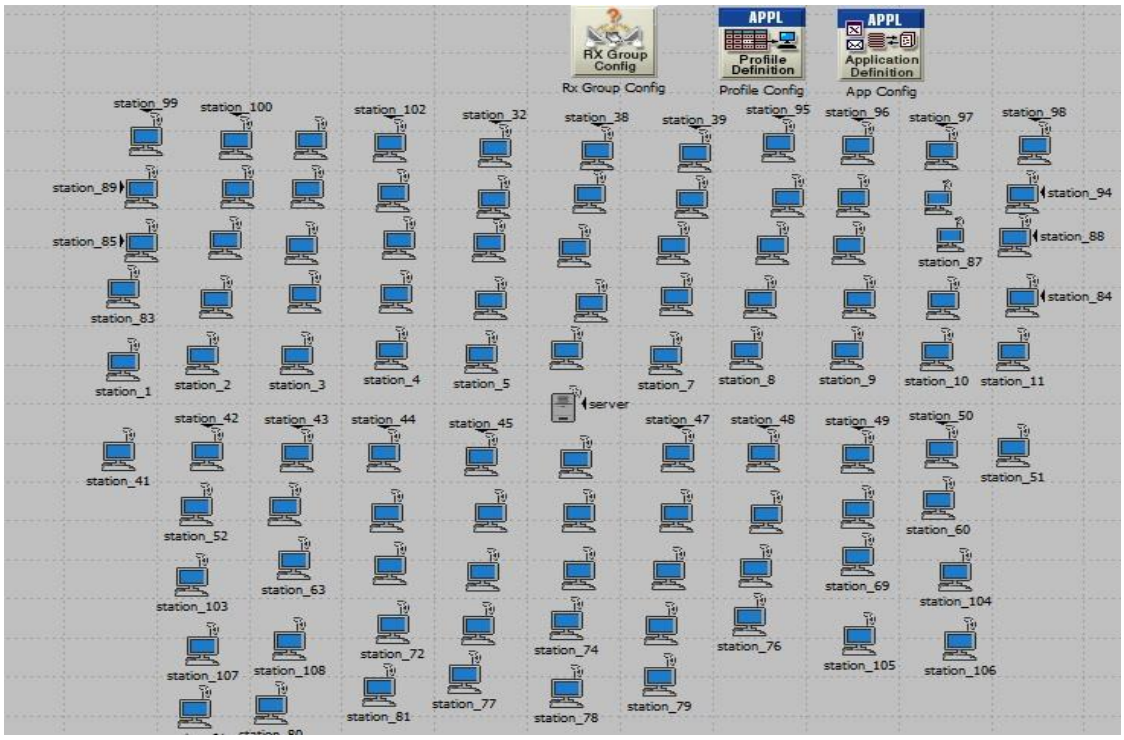

Fig 2 Large Network model

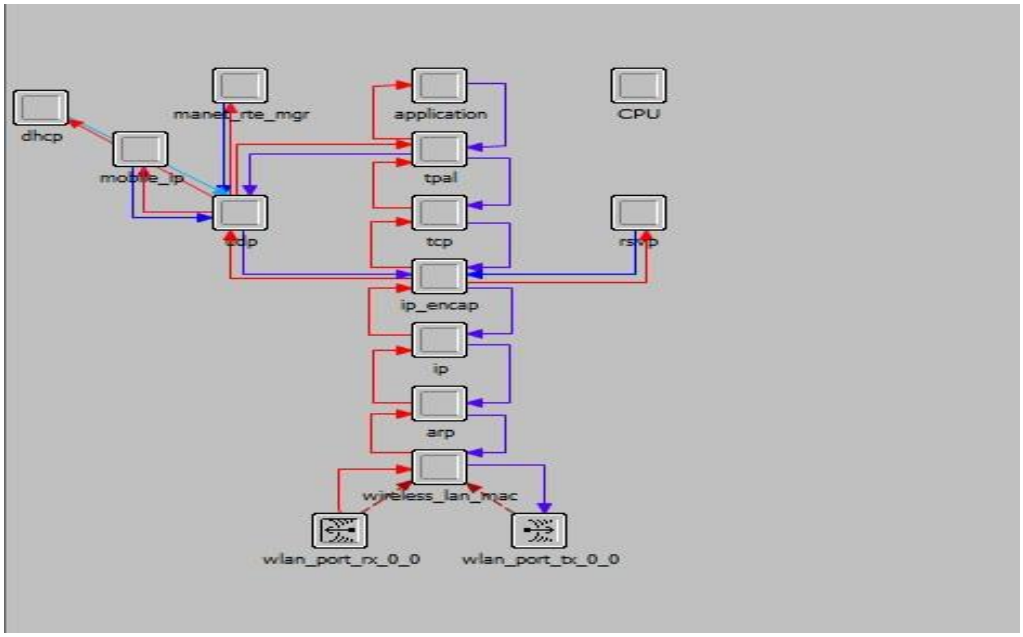

Fig 3 Node Model

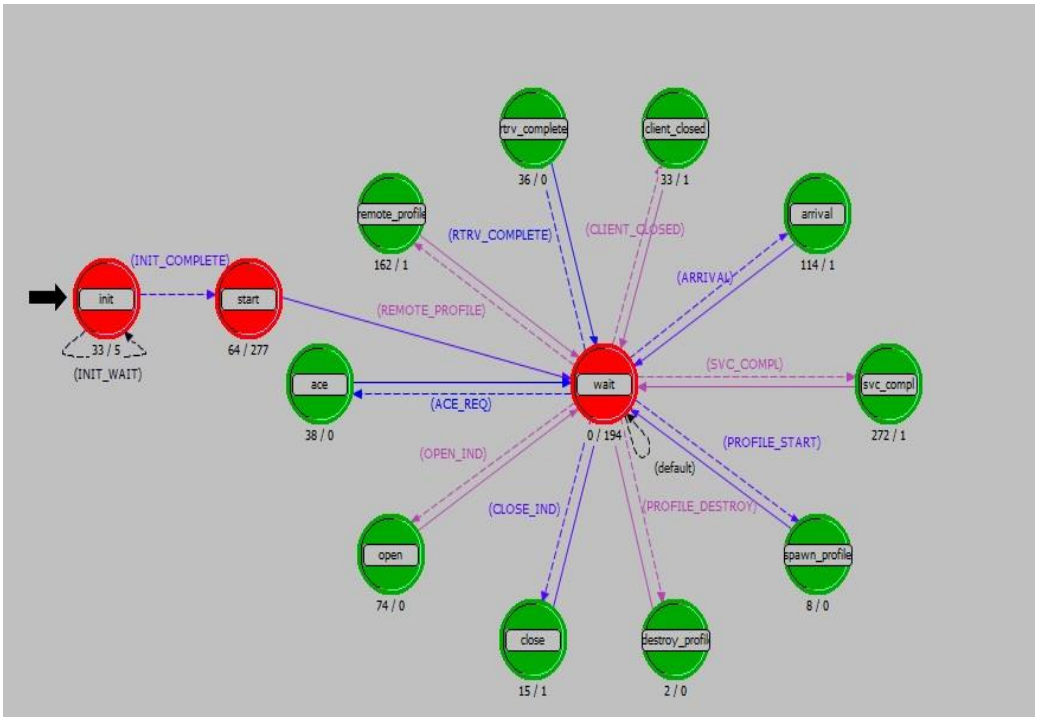

Fig 4 PROCESS Model

PARAMETER SETUP

The network designed consists of basic network entities with the simulation parameters summarized in table 1, and 2.

⊟ AD-HOC Routing Parameters	
··· AD-HOC Routing Protocol	TORA
⊞ AODV Parameters	Default
⊞ DSR Parameters	Default
⊞ GRP Parameters	Default
⊞ OLSR Parameters	Default
⊟ TORA/IMEP Parameters	(...)
··· Router ID	Auto Assigned
⊟ TORA Parameters	(...)
··· Mode of Operation	On-Demand
··· OPT Transmit Interval (seconds)	300
··· IP Packet Discard Timeout (seco...	10
⊟ IMEP Parameters	(...)
··· Beacon Period (seconds)	20
··· Max Beacon Timer (seconds)	60
··· Max Retries (number of attempts)	3
··· Max IMEP Packet Length (bytes)	1,500
··· Route Injection	Disabled

TABLE: 1 TORA Parameter Values

⊟ Wireless LAN	
··· Wireless LAN MAC Address	Auto Assigned
⊟ Wireless LAN Parameters	(...)
··· BSS Identifier	Auto Assigned
··· Access Point Functionality	Disabled
··· Physical Characteristics	Direct Sequence
··· Data Rate (bps)	1 Mbps
⊟ Channel Settings	(...)
··· Bandwidth (MHz)	Physical Technology Dependent
··· Min Frequency (MHz)	BSS Based
··· Transmit Power (W)	0.005
··· Packet Reception-Power Threshold...	-95
··· Rts Threshold (bytes)	None
··· Fragmentation Threshold (bytes)	None
··· CTS-to-self Option	Enabled
··· Short Retry Limit	7
··· Long Retry Limit	4
··· AP Beacon Interval (secs)	0.02
··· Max Receive Lifetime (secs)	0.5
··· Buffer Size (bits)	256000

TABLE: 2 WLAN Parameter Values

SIMULATION RESULTS

While comparing the performance of TORA in two scenarios, we focus on four performance measures Load, Delay, network coverage activity and duration, number of hops and retransmission attempts.

Load

Network load represents the total load in bit/sec submitted to wireless LAN layers by all higher layers in all WLAN nodes of the network. When there is more traffic coming on the network, and it is difficult for the network to handle all this traffic so it is called the network load. After simulation of 3600 sec. delay value in TORA protocol using 50,100 Node with 802.11b is shown in figure small size network are 600000 and large size network are 2,100,000.

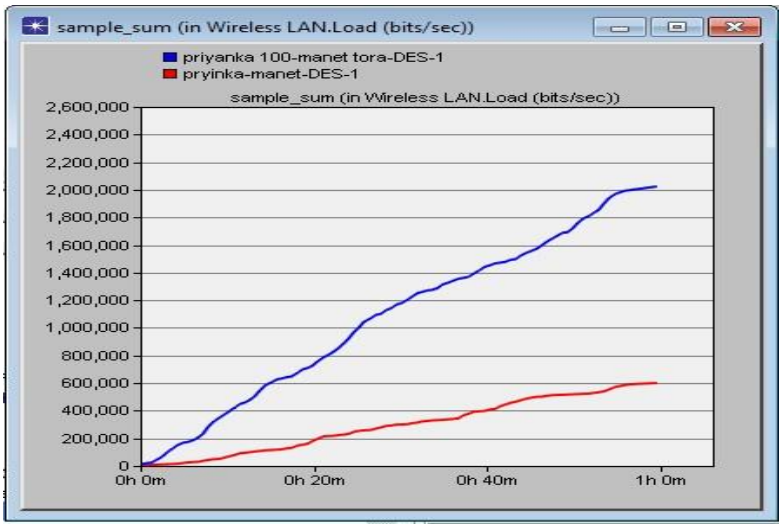

Fig 1 WLAN Load (bits/sec)

Retransmission Attempts

After simulation of 3600 sec. retransmission attempts value in TORA protocol using 50,100 Node with 802.11b is show in figure small size network are 120 and large size network are 100.

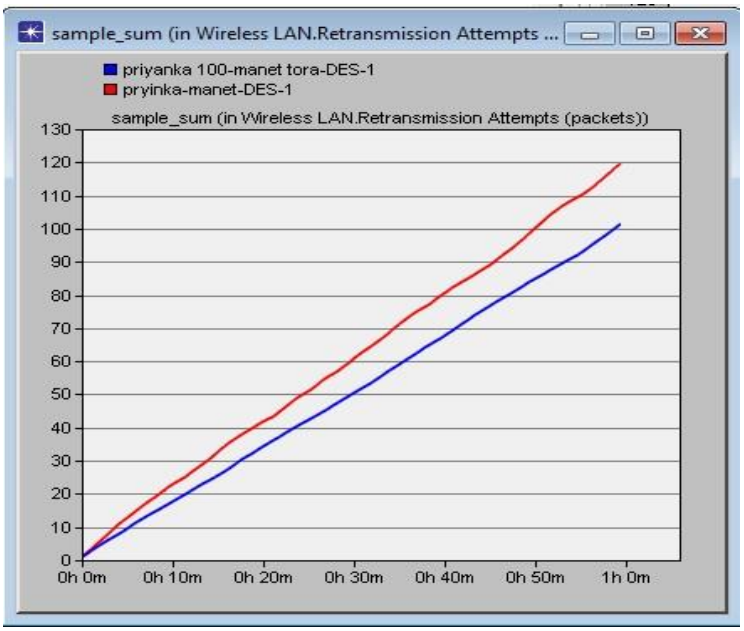

Fig 2 Retransmission attempts (pkts)

Delay

The packet Media access delay is the time of generation of a packet by the source up to the destination reception. So this is the time that a packet takes to go across the network. This time is expressed in sec. After simulation of 3600 sec. delay value in TORA protocol using 50,100 Node with 802.11b is show in figure small size network are 0.10 and large size network are 0.27.

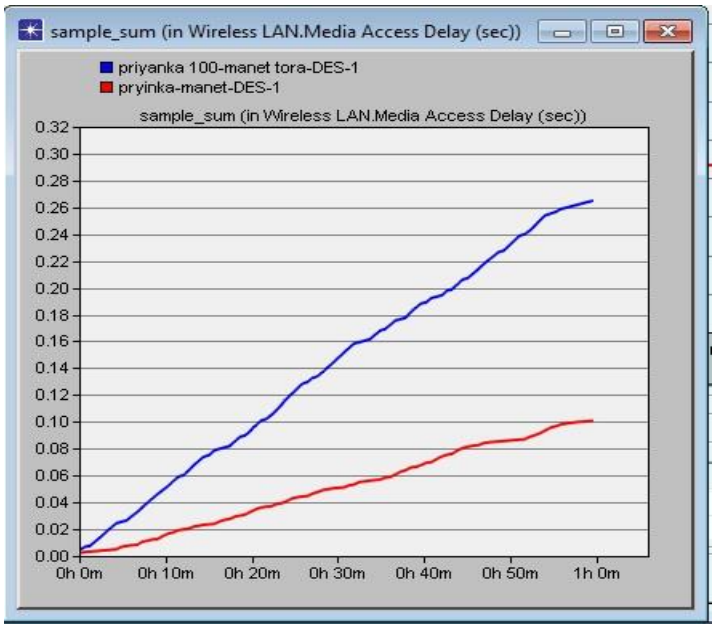

Fig 3 WLAN media access delay

Network Convergence Activity

After simulation of 3600 sec. Total cache replies sent value in TORA 50,100 Node using 802.11b is shown in figure 4

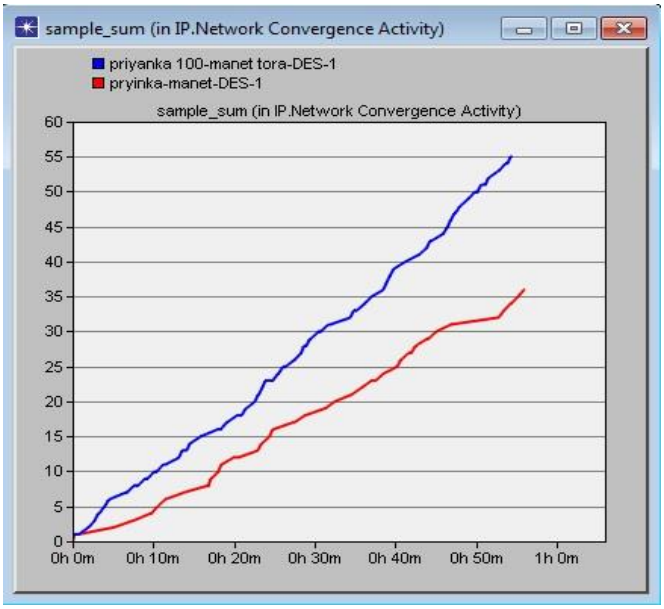

Fig 4 network coverage activity

Network Convergence Duration

After simulation of 3600 sec. Number of hops per route value in TORA 50,100 Node using 802.11b is shown in figure 5

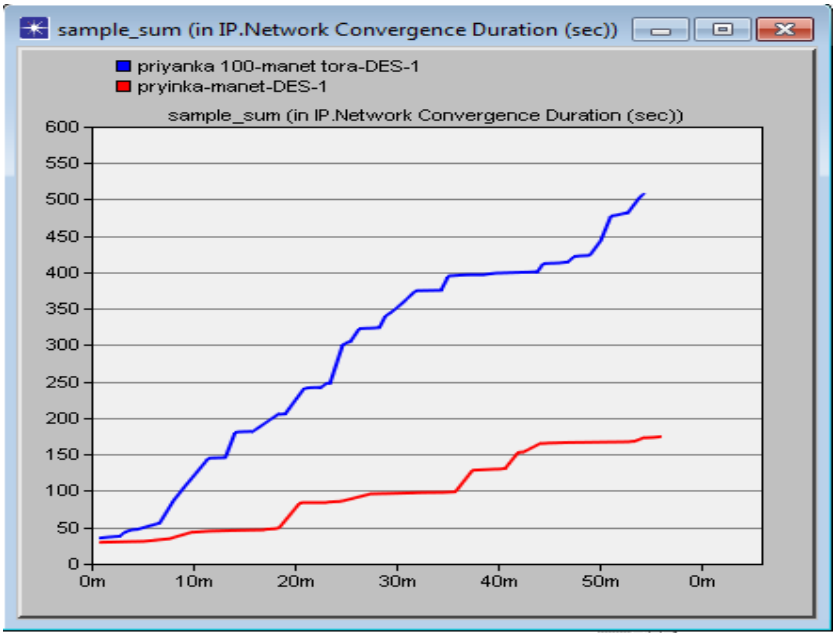

Fig 5 Network coverage duration.

Number of hops

After simulation of 3600 sec. the no. of hops per route value in TORA 50,100 Node using 802.11b is shown in figure 6

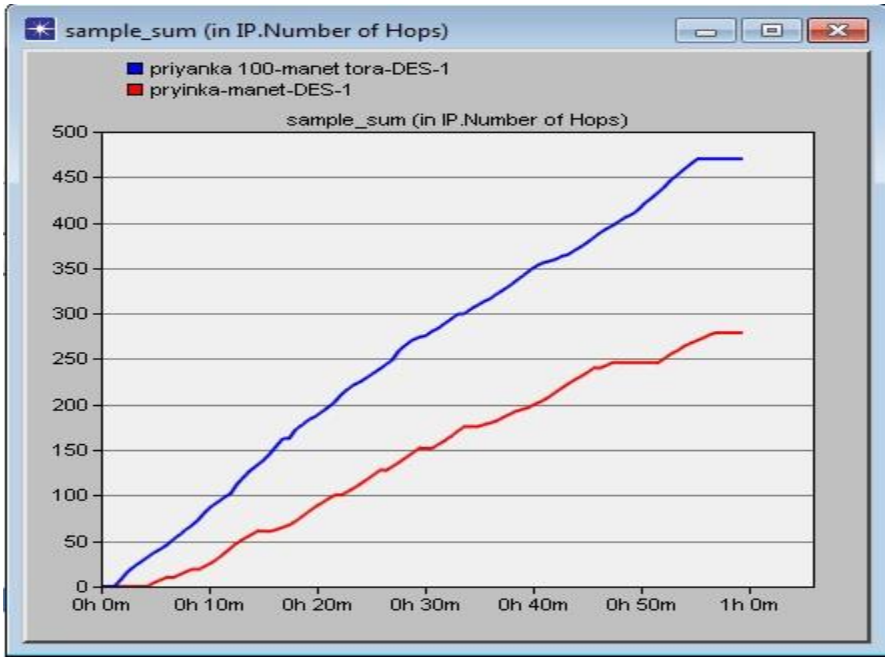

Fig 6 Number of hops.

CONCLUSION

In this paper, we analyze the performance of mobile Ad-hoc network in TORA routing protocol. The simulation results shows TORA protocol has better performance in the term of delay, Network coverage activity and duration, routing number of hops, Retransmission attempts, load. The same result also holds good for other networking applications. On the basis of this simulation we can deploy the network in all over the world with efficiently and provide the platform for location based security because security is the primary concern for any ad-hoc network

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