Performance Analysis of Routing Protocols IGRP, RIP, EIRP, OSPF using Networks connecter

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Abstract. In this time internet on depend group of basis of IP Routig protocols. This paper study Characteristics of routing protocols important in performance network. Any router in network needs help to routing protocols .that deferent types from routing protocols used in networks for example RTP(routing information protocol),OSPF(Open Shortest Path First) ,EIGRP(Enhanced Interior Gateway Routing Protocol),IGRP(Interior Gateway Routing Protocol), Any data that needs to be routed through the transmission of data from the source to the destanation depending of routing protrocols. Choosing the appropriate routing protocol by scanning protocols on a network depends type of applications Network and a number of parameters traffic sent,traffic recived etc. In addition this paper presents advancement in routing technique highlighting the difference between RIP,OSPF,EIGRP,IGRP in terms of metrics and other technical aspects. In this   investigation networks depend on different types of routing protocols and study of impact of flapping links on convergence time, packet end to end delay, Average opint to point throughput (bit/sec) of network.

1   Introduction

Development Technology in present time is based on IP routing protocols. Route data in any network needs routing protocols based on routing algorithms. which depend on various parameters to find the best path to transmit data across networks. Parameters include cost, bandwidth, maximum transmission unit (MTU), packet delay, and hop count. Routing protocols used a routing table to store the results of these metrics. Based whether the routing is within an Autonomous System (AS) or between ASs, there are two types of routing protocols: Interior Gateway Protocols (IGP) and Exterior Gateway Protocol (EGP). RIP, EIGRP, and OSPF are three commonly used IGPs. A typical EGP is the Border Gateway Protocol (BGP).Depend to designed of routing protocols to select and determine the best path to each route in any network. For selecting path in any network need route packet switching in network.[1]. In this paper many routing protocols for example RTP,EIGRP,IGRP,OSPFand training choice for best in specifications through using some parameters to determine performance in networks. The classification of routing protocol is shown diagram down . That dynamic routing protocol can be used to configuring routing tables in the router. There is Interior Gateway Protocol (IGP),Routing Information Protocol (RIP), Enhanced Interior Gateway Routing Protocol(EIGRP), Open Shortest Path First (OSPF) and ISIS(Intermediate System – Intermediate System). And for the routers in different domain network, Exterior Gateway Protocol (EGP) can be used such as Border Gateway Protocol (BGP).For the router in the same domain network. The routing protocol classified into dynamic routing protocol and static routing protocol. From number of dynamic routing protocol used configure routing tables in the router. The protocols EIGRP and OSPF both of them dynamic routing protocols can be used in both IPV4 and IPV6.In under shown diagram of classification of routing protocols.[2]
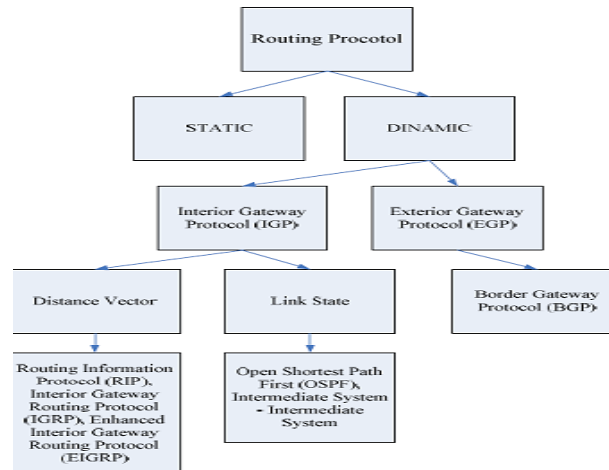
Fig: 1 Routing protocol classification [2].

2 Type of rotting protocols

2.1 Routing Information protocol(RIP)

Routing Information protocol is represented ancient distance vector routing protocol that uses hop count as metric. It is move stability and becomes quick send the packet through another connection after confirmed that if the network low level. That found four types of RIP are RIP routing metric, routing stability , routing timers and routing update process. Through researchers have proposed(Bellman,1957 Ford and Fulkerson,1962).when a router to update its routing table . it is send all the essential information from adjacent routers routing table. When it receives a distance vector, checks for changes from the previous distance vector received from the same neighboring router, in this case that results positive. routing timers and routing update process. When topology change routing table updated with the help of timers. The advantages of static routing using RIP that starting configuration are simple, but manually updates not requires when topology becomes changed.[3]

2.2 (Enhanced Interior Gateway Routing Protocol)EIGRP

Is the type of protocols of "distance vector" and that found in 1992, was an improvement protocol IGRP, both Cisco proprietary and can only operate on Cisco routers. EIGRP can learn in a dynamic way on the routers directly connected to a network, this is similar to the protocol "Hello" used to discover OSPF neighbors on a network. A network equipment EIGRP packets change "hello" to ensure that each neighbor is operational. As in the case of OSPF, the frequency of the exchange of packets based on the type of network where high bandwidth links exchange is carried out at intervals of 5 seconds, and in the case of connections requiring low bandwidth, the packets are exchanged every 60 seconds, as in . EIGRP does not rely on periodic updates to converge in the topology, instead building a table that will contain announcements on neighbors about changes in topology; data is not removed as in distance vector protocols. Topology table information is processed to determine the best path to each destination network, EIGRP implementing an algorithm known as the diffusion update algorithm (DUAL).[4]

2.3 (Open Shortest Path First)   OSPF

(Open Shortest Path First) protocol in state development by the Interior gateway protocol (IGP) working group of the Internet Engineering Task Force (IETF). This group was founded in 1988 to design an IGP based on the shortest path first algorithm using in internet and an algorithm based on state bonds.[5] Each router connect direct to other router near from it. That exchange information between him. In all network router sens (detects) that its direct neighbors and transmission data to other router. This data carrier by link state packet . these packets are transmitted by the selective flooding and taken to destination routers update their own data base with synchronization perform at internal of 30 minutes. the LSP packets. Each router maintains a database on which the graph of the network will develop its own routing table, as in Routers

running this protocol accumulates information linkages on the state calculates the shortest path to a given network algorithm is known as Dijsktra algorithm. Each node is labeled with the distance from the source node to it, all nodes will be labeled with infinity. Initially, all tags are temporary.[4] (Open Shortest Path First) keep the routing table for all connections in the network while (Routing Information protocol) only keep the routing table of the best path for every destination. Each OSPF router stores the local network connection state with Link State Advertisement (LSA) and advertises to the entire AS. Each router receives the LSA generated by all routers within the AS. The LSA collection then forms Link State Database (LSDB). Each LSA is the description of the surrounding network topology of a router. Hence, the LSDB reflects the AS network topology.[6]

2.4 Interior Gateway Routing Protocol (IGRP)

is a distance vector interior gateway protocol (IGP) used by routers to exchange routing data within an autonomous system. IGRP is a proprietary protocol. IGRP was created in part to overcome the limitations of RIP (maximum hop count of only 15, and a single routing metric) when used within large networks. IGRP supports multiple metrics for each route, including bandwidth, delay, load, and reliability; to compare two routes these metrics are combined together into a single metric, using a formula which can be adjusted through the use of pre-set constants. By default, the IGRP composite metric is a sum of the segment delays and the lowest segment bandwidth. The maximum configurable hop count of IGRP-routed packets is 255 (default 100), and routing updates are broadcast every 90 seconds (by default).IGRP uses protocol number 9 for communication. IGRP is considered a glassful routing protocol. Because the protocol has no field for a subnet mask, the router assumes that all sub network addresses within the same Class A, Class B, or Class C network have the same subnet mask as the subnet mask configured for the interfaces in question. This contrasts with classless routing protocols that can use variable length subnet masks. Glassful protocols have become less popular as they are wasteful of IP address space.[7]

3 NETWORK SIMULATION RESULS:

Attributes	value
Simulator	OPNET Modeller 14.5
Simulation	Time 200 minutes
Scalability	10 x 10 Km2
Traffic type	Voice over IP Call Quality GSM
Number of Subnet	5
Model object	100BaseT_LAN
Type of Router	CISCO 7000

Table 1. Simulation Scenario for Network.

From Table 1 network content on 5 subnets connected to each other with Point to Point Protocol using Digital Signal 3 (DS3, 44.736 Mb/s). Each subnet consists of Cisco 7200 routers, Cisco 3600 switches, Ethernet server, and 100BaseT LANs. These nodes are connected with Ethernet 100BaseT cables as shown in Figure 1. In this paper, study comparative analysis of protocols. This comparison is based on simulation in OPNET 14.5 for a given network with a semi-mesh topology. In this research, the combination of RIP/EIGRP/OSPF/IGRP. Because increasing demand of improve speed Internet and more amount of traffic in the communication networks, needs the solve problems of congestion occurred in the network operation and its performance should be greatly reduced. To increase the efficiency of a network with given topology,[8]
 In this network Comparing in different parameters for examples traffic sent ,receive, end to end delay ,throughput, packet delay variation, Add using type from application for example sound (VOIP) voice over IP study all stats in network .In through work in this research to divided number from scenarios depend on OPNET 14.5 ;
SCENARIO 1: In this scenario tray design network Fig.1 consist of number from internal networks where depend on subnet work in central but other around connect together to server add study different statment using type of routing protocols.RIP.
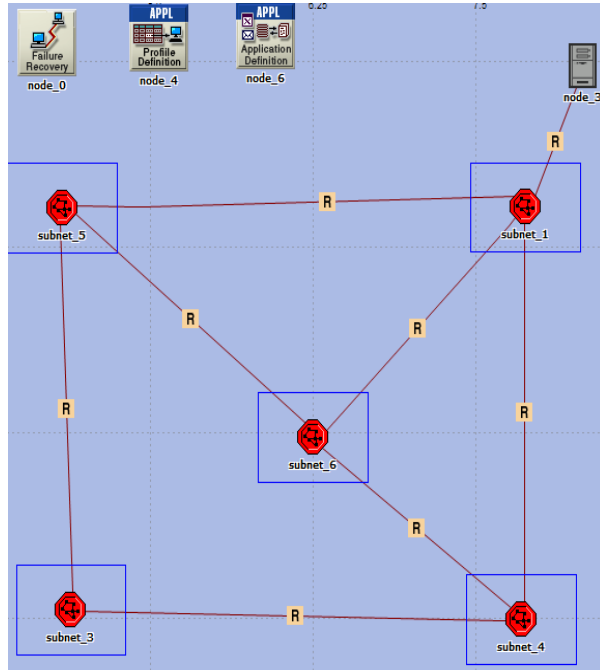
Fig 1. network content on number sub networks used protocol RIP

Figure 2 to study states protocols in network original A schematic view of the internal network content from fixed node, Cisco 6000 routers   and server In this network depend on protocol RIP with application voice over IP using time running 200 second .
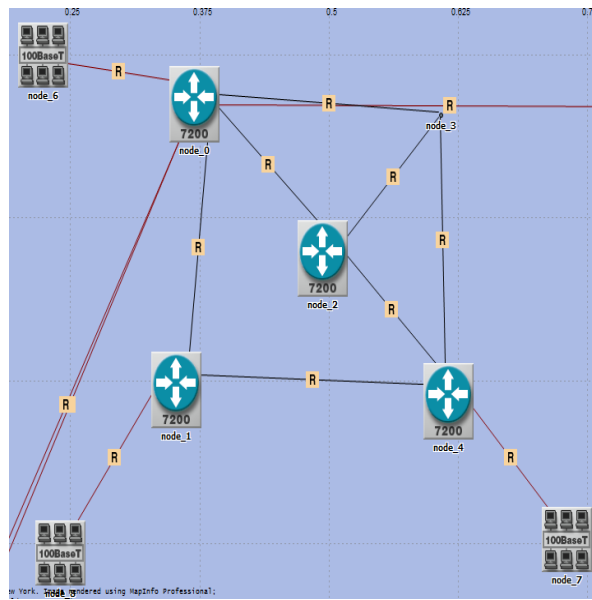

Fig.2 shown content network internal

In network internal number from router Cisco from type 7200 contact together with gropes of Workstations, we applied the Links with transmission rates of 100Mbps, which is called 100BaseT in the software library from OPNET 14.5. For voice application type voice over IP, encoder scheme G.711(silence) add type of service interactive voice(5) and voice GSM Quality speech scheme GSM FR with type of service Best Effort.[9]
 SCENARIO 2: In this scenario using same network in analyses protocols where used protocol EIGRP shown down in Fig 3 In this network depend on protocol EIGRP with application voice over IP using time running 200 second.
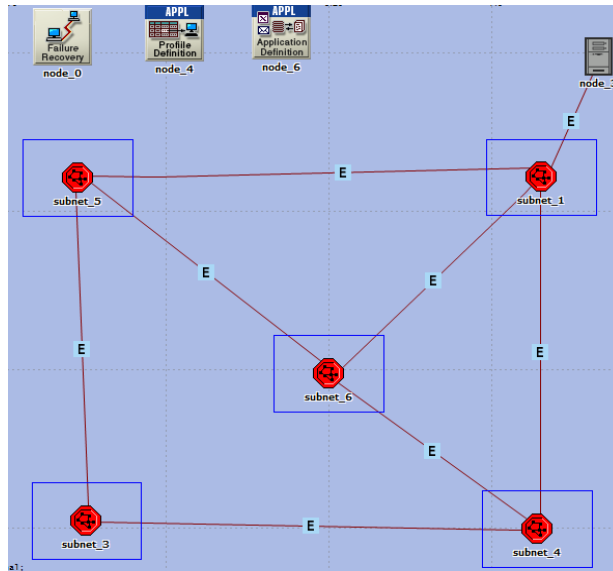
Fig .3 network content on number sub networks used protocol EIGRP

Used voice application type voice over IP, encoder scheme G.711(silence) add type of service interactive voice(5) in state used protocol EIGRP.

SCENARIO 3: In this scenario repeat process in same network but another protocol OSPF add study performance this protocol from used different parameters shown in internal networks later shown in **Figure 4**
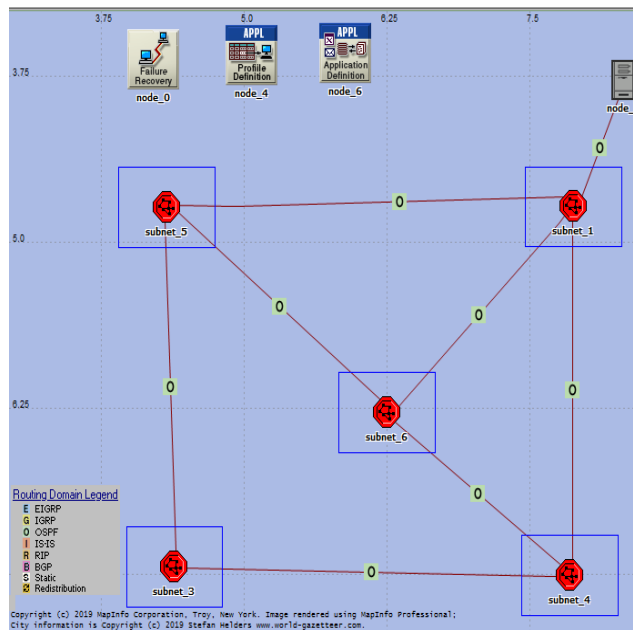

Fig.4 network content on number sub networks used protocol OSPF

Used application 2 type from voice over IP ,scheme G.711(silence) and voice GSM Quality speech.
Through excuation of sumlation get on protocols traffic sent   you can differnt between level depending on charcstics of protocols on network.protocol EIGRP reach to high level compuring with other protocols .add, that notice get protocol RIP on low level .
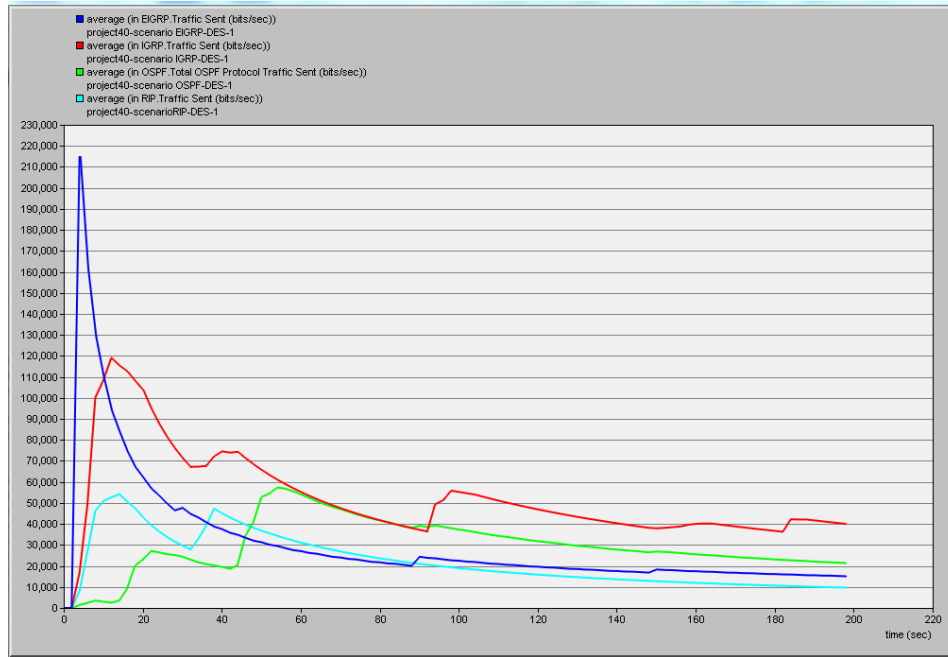
Fig 5. Shown protocls Trffic sent(bit/sec) on network

From Fig 5. Notice from traffic sent protocols that EIGRP get on high level reach 215,349.34 average traffic sent with time 4s compuring with RIP to reach 54.168 average traffic sent with time 14s protocols in netwok measurment unit data on time,in same time get on low level protocol RIP depending on move data from point to other point.
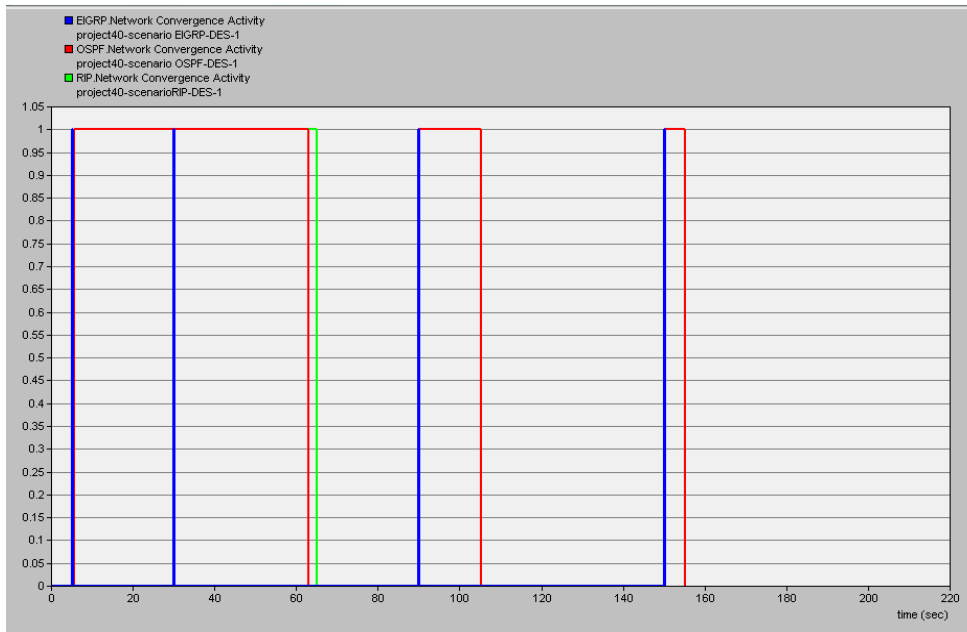

Fig.6 shown network convergnce activty recovery and fiall in 200 sec.

The EIGRP and the OSPF and RIP protocol experience the shortest and the longest network convergence times, respectively, notice routing protocol OSPF need time 155s according configuration of time summation, and protocol EIGRP need time 150s shown on above.
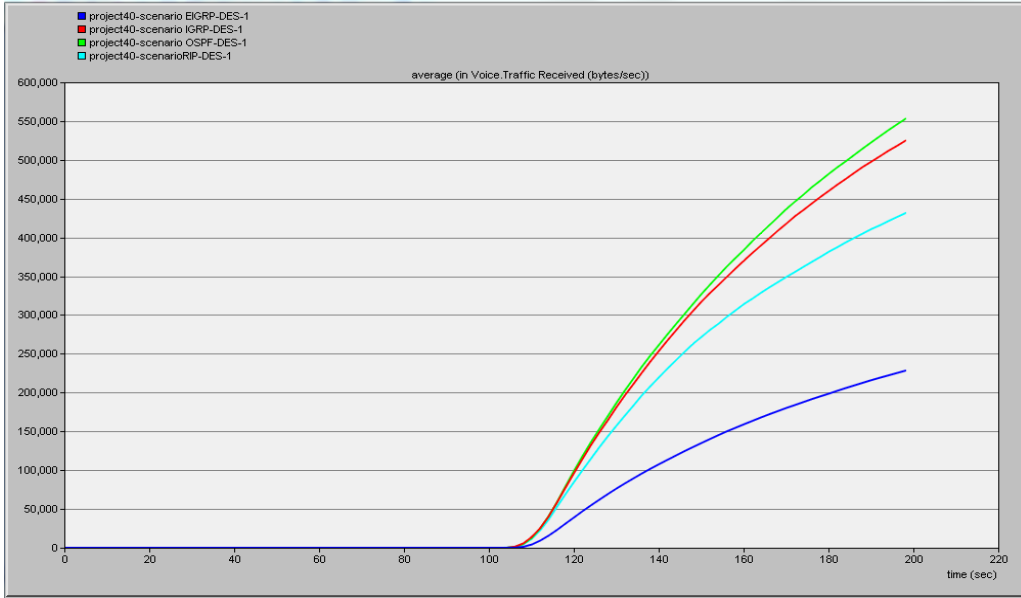
Fig 7. Shown averge voice traffic recived (byte on sec)

In fig 7. Notce traffic recived data(voice) in unit byte on sec get protocol OSPF on high level and get protocol EIGP on low level in netwok .
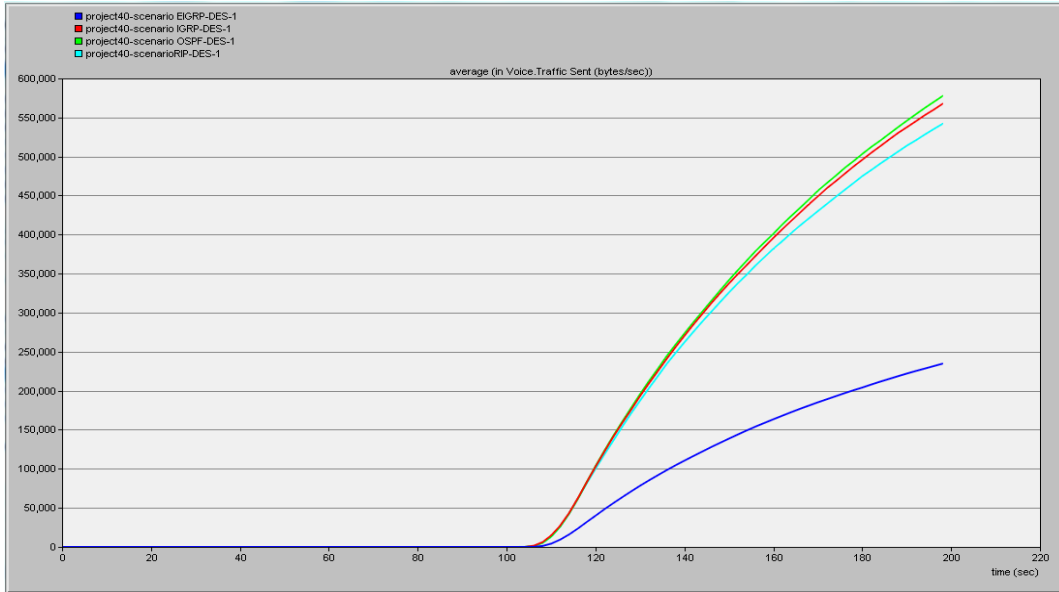

Fig 8. Shown averge voice traffic sent (byte on sec)

In fig 8. Notce traffic recived data(voice) in unit byte on sec get protocol OSPF on high level and get protocol EIGP on low level in netwok .
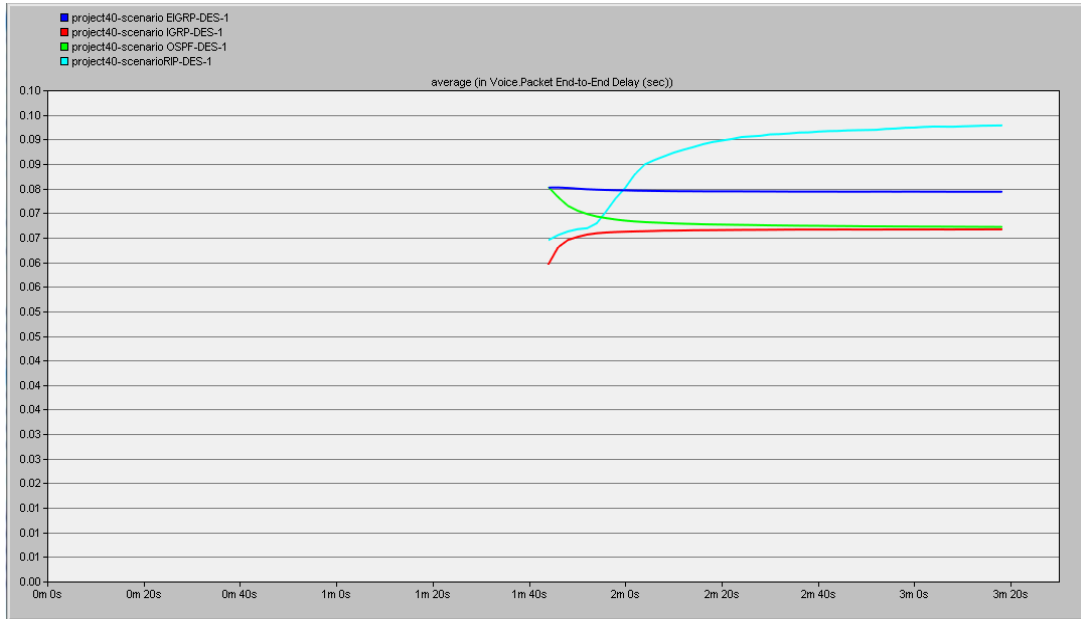
Fig.9 Average voice packet end-to-end delay sec with 300 s .

protocols RIP,OSPF,IGRIP,EIGRP levels delay packet in used application voice experience the lowest and highest delays, respectively, as shown in Fig.9.
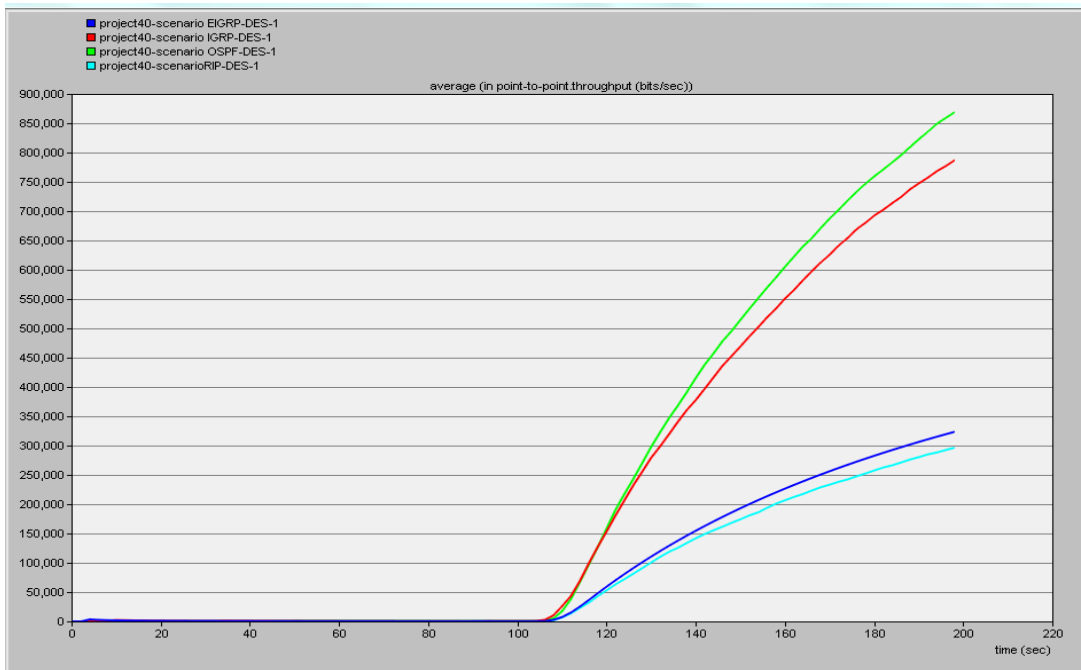

Fig. 10 Average opint to point throughput (bit/sec)

From Fig.10 taking sample from nodes averge throghput point to point excuting on protocols IGRIP,RIP,OSPF,EIGRP shown levels throughput highist and lowest used on these protocols.
Have OSPF protocols high level averge throughput compuring with other protocols.

4   Conclusion

In least years more challenges in technecol of routing protocols .In this paper discuion using protocols EIGRP,OSPF,RIP,IGRP with some parameters in find properties and differnt between of routing protocols. Add choosing various routing protocols and parameters with differnt scenarios and discussed used application of voice traffic ,average end to end delay and average pont to ponint throughput in order to understand performance in differnt routing

protocols of which the features as well as the advantages and disadvantages have been analyzed in the paper.Used OPNET 14.5 in all scenarios.By network design make routing protocols better performance and more effcincy in the network.

5   Refernces

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