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Assessing the Performance Analysis of OSPFV3 and EIGRP in Applications in IPV6 Analysis for Articles Published in Scopus between 2016 and 2021

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

The Analysis of common conceptual frameworks associated with Performance analysis of OSPFV3 and EIGRP in applications in IPV6 for analysis of articles published in Scopus between 2016 and 2021 by applying the Corresponding method analysis. The number of times an article is downloaded is also being considered as a measurement instrument or method of analysis. The Corresponding analysis method has analysis 117 articles from 2016 to 2021. All the articles are based on performance analysis of OSPFV3 AND IPV6.IPv6 has gained legitimacy and inevitability as a result of the internet's expansion, which has resulted in IPv4 address space exhaustion. An internet next-generation protocol that will replace eventually IPv4 is IPv6. Using Riverbed Modeler Academic Edition, 2state link protocols' performance for IPv6, IS–IS and OSPFv3 was compared and tested for the greatest commonly utilized applications enterprise for example remote login, database query, file transfer, web surfing, and email. The major characteristics used to assess performance include IPv6 packets dropped, network convergence time, link utilization, throughput, remote login response time, file upload/download response times, http page response times, email, and database query response time,. The primary goal of this dissertation is to compare, simulate,

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and assess both routing protocols' performance in order to decide which one is best for routing IPv6 network traffic. Based on the parameters utilized, the protocol that performed better than the others would be suggested for routing network traffic in IPv6. The study was separated into two scenarios to achieve this goal: the IS–IS and OSPFv3 scenario. After the simulation for the IS–IS scenario was completed, the data from both scenarios were compared and examined using the provided parameters to see which protocol worked better. Based on the majority of the simulation parameters employed, the simulation results showed that OSPFv3 was performed as compared toIS–IS.

Keywords: IPv6; network; routing; traffic; Riverbed; VOSviewer; OSPFV3 and EIGRP.

1. INTRODUCTION

In this 21st Century, computer technology is growing quickly and is relevant for the life of the people [1]. Networking and data communication have altered how we conduct business and communicate with one another [2]. Through the methods of communication and business that we perform in this modern society, we can easily isolate the world. We share information and data when we communicate, which makes life more meaningful and fascinating. The routing mechanism must provide a higher level of network capability for the complete computer system [3]. As a result, routing is the most critical aspect of network performance. In the networking world, the routing protocol is the most important. The advantages of data transmission technology are provided by networking and protocols routing [4]. It sends packets from the basis to the target using the medium of communication. Protocols routing describe the way2 routers connect with one another, including how they share data, resources, and information [5].

The method of determining the cost effective route from a source to a given destination is routing. It can be done in real time utilizing routing protocols based on various routing algorithms. Interior "Gateway Routing Protocols (IGRP) and Exterior Gateway Routing Protocols (EGRP)" are two types of protocols routing, according to [6] EGRPs include proteins like BGP. Hybrid routing protocols, link state, and distance vector are all types of IGRP. RIP, EIGRP, ISIS, and OSPF are the most popular IGRPs. Sankar & Lancaster [7] define convergence as the ability to adapt quickly to network variations, the capability to select the best path amongst several routes, and routing amount traffic made by different routing protocols. Protocols routing are acute to a network success. Most IPv4 protocols routing have been modified to work with IPv6 addresses, which have a different header design. The functions and configurations of IPv6 routing protocols are similar to those of IPv4, but because IPv4 is shorter than IPv6, updates routing must convey added info [8].

These routers make adjustments to their routing table based on previous experience. It likewise aids protocols routing in choosing the optimum nodes, path, or routers on network. The activities of these routers differ from one another. Router presence in an IP/TCP network is critical. It requires a system routing that can connect lots of computers with greater flexibility. IPV6, on the other hand, uses 32 bits to provide addressing space [9]. IPV6 protocol addresses can accommodate 4.3 million internet users. The IPv6 final address space became available in February 2014, allowing for the quickest development of the internet. With 128 bits of addressing space, IPv6 is strongly recommended for OSPFV3 and EIGRP. Over IPv4, IPv6 improves security mechanisms such as encryption and evidence utilizing cryptographic keys [10].

As a result, network administrators and IT specialists must evaluate the performance of each type of routing protocol using a variety of factors. EIGRP, OSPF, RIP, and IS-IS are the protocols used by internal gateways. As a result, this research focus is on these routes' performance between 2016 and 2021. The writer uses OSPFV3 and EIGRP in applications in IPV6 Analysis [11]. These routings are EIGRPv6 and OSPFv3 and their performance evaluation using IPV6 analysis approach. Hence, the Corresponding analysis method has analysis 117 articles from 2016 to 2021. All the articles are based on performance analysis of OSPFV3 AND IPV6.The article are collected from Scopus database for analysis. The Shortest Open Path routing First protocol for IPv6 is OSPFv3. OSPFv3 is an IPv4 and IPv6 protocol routing [12]. It is not a "distance-vector protocol",

nonetheless rather a “link-state protocol”. Consider a connection to be a networking device's interface. The links states that link the destination and source machines are used by a link-state protocol to make routing decisions. A link's status is an interface description and its association to other devices of networking. The “IPv6 prefix of the interface, the type of network the network mask, it is connected to, and the devices linked to that network”, etcetera are all included in the interface information [13]. This information is disseminated using a variety of link-state advertising (LSAs).

EIGRP “(Enhanced Interior Gateway Routing Protocol)” is an improved distance-vector protocol routing for configuration on a network computer and automating decisions of routing. EIGRP is a protocol routing that permits routers in equal system autonomous to share paths. Different from other well-known protocols routing, for example RIP, EIGRP delivers only updates incremental, which reduces the router's burden and data quantity that need to be transported [14]. EIGRP “(Enhanced Interior Gateway Routing Protocol)” is a gateway interior protocol used with many media and topologies. EIGRP effectively scales and delivers fast exceptionally times convergence with little traffic network optimal path in a well-designed network [15]. The vector denotes the direction in which the remote network can be reached. Distance vector protocols include RIPv1, RIPv2, and IGRP [16] distinct principle governs link state protocols. They construct three separate tables to employ in their routing system. Entire networks connected directly to the routers are stored in the first table. The entire internetwork map is stored in the second table. Table routing is the third table, and it stores the shortest path between “all remote networks in the internetwork. The main difference between these two routing algorithms is that in distance vector routing, the entire routing table content is exchanged between routers that are directly connected to each other, whereas in link state routing, routers only share routing updates” with other routers in the network, which contain the state of their own links [17].

This study focuses on two IPv6 IGPs in particular. “OSPFv3 and IS–IS are the two. Both protocols are modified versions of OSPF and IS–IS that are supported in IPv4 networks, and they were chosen for performance evaluation for routing some of the most commonly used IPv6 applications” [18]. They can also detect alternate routes and retransmit traffic via these channels with minimum disturbance when a node or route fails. All routing protocols have different levels of scalability. Some protocols scale better than others. When considering the current rate of network growth, scalability of routing protocols is critical. As a result, while determining a protocol routing to use on a network, the scalability of the protocol need to be taken into account. There are 2 protocols routing types. They are “Interior gateway protocols (IGPs) and exterior gateway protocols (EGPs)” [19]. Interior gateway protocols are utilized to allow routers in equal system autonomous to share routing information (AS). An AS is a collection of networks that are all operated by the same company. The info in a table routing for entire routers in an AS is the same. IGP includes RIPv2, RIPv1, EIGRP, IGRP, IS–IS, and OSPF [20]. Exterior protocols gateway are u to permit communication between dissimilar systems autonomous. The “border gateway protocol (BGP)” is an instance of an outside gateway protocol [20].

2. LITERATURE REVIEW

2.1 Related Work

Many articles have looked into the performance of routing protocols. Using numerous simulators such as Cisco packet tracer, OPNET, and GNS, the authors compared and studied dissimilar protocols routing’s performance“(RIP, EIGRP, IS-IS, and OSPF) (Graphical Network Simulator)”. The researchers evaluated the various applications focused on a number of factors before drawing conclusions. EIGRP outperformed RIP and OSPF regarding CPU utilization, end-to-end delay, convergence time, throughput, bandwidth control, and data transfer rate, according to the findings. Researchers compared and studied 2protocols routing’s performance (OSPFv3 and EIGRPv6) with the topologies identical in Manzoor, Hussain & Mehrban. Due to the need in recent rapidly increasing based computer networks, researchers examined routing protocols with IPv6 network environments in these linked works. However, according to Garg, P., and A. Gupta these studies do not include an evaluation of IPv6. Other closely similar research include [21] in which the authors analyzed and evaluated the performance of 2protocols routing (EIGRPv6 and OSPFv3) in a small network. Studies concentrated on network analysis configuration and found that configuration IPv6 directives are extra difficult than configuration IPv4 directives due to the complexity of IPv6 addresses. OSPF

protocols routing delivered superior "QoS (Quality of service) than RIP", according to a study by Shamim, Badrul & Islam [2].

Studies used simulators to test protocols routing in IPv6 networks and found that EIGRPv6 outperformed OSPFv3 regarding transfer packet in a small network. The routing protocols' performance in a mixed IPv6-IPv4 network was not specifically evaluated in these research. The researchers analyzed and examined distinct protocols routing's performance in a network hybrid IPv6-IPv4 centered on dissimilar standards in. Furthermore, the researchers assessed protocols routing's performance (OSPF& EIGRP) for user traffic in dual-stack networks, IPv4 networks, and pure IPv6 networks using a variety of parameters such as (convergence time, RTT, end-to-end delay, throughput, jitter, packet loss, memory use and CPU) [5]. Also, the researchers shows the step by step configuration of OSPF and OSPFv3 routing protocols in IPv4 and IPv6 network using command line interfaces. Mahmood [6] also incorporates different comparisons and exhibits the research results utilizing data table, figure, line graphs, comparison table, and bar charts, etcetera. It also enables those who are interested in research to connect with the work and obtain accurate info and recommendations for future work and study in precise terms.

Some researches given by various writers are evaluated to offer previous work overview. Sankar & Lancaster compared EIGRP and OSPF, two protocols routing. Routing metrics range, hardware resilience, throughput, fast convergence once topology varies, lower routing overhead, scalability, routing protocol security, and configuration difficulty have all been compared between the two protocols. According to the findings, the EIGRP protocol outperforms OSPF. Using OPNET, Narula & Aggarwal analyzed OSPF and RIP performance for IPv6. Jitter, end-to-end delay, object response time, packet delay variation, response time, traffic dropped for IPv6, and page response time, etcetera are some of the criteria to compare. They discovered that using RIPng and OSPFv3 together does better than using OSPFv3 and RIPng distinctly. Whitfield & Zhu evaluated the security techniques used by each routing protocol and compared EIGRPv6 with OSPFv3. The main conclusion was that EIGRPv6 outperforms OSPFv3 regarding re-convergence times and startup, making it the quicker protocol. However, because it combines a sophisticated security approach and works in a hierarchical topology, OSPFv3 is an appealing alternative for use as a routing protocol. "Sirika & Mahajine (2016) investigated RIP, EIGRP, and OSPF and compared their performance in a variety of real-time applications, such as VoIP and video conferencing, based on convergence, end-to-end packet latency, packet delay variation, and queuing delay. They discovered that even OSPF is difficult to configure; nonetheless, it is a widely used protocol since it is an open standard with rapid convergence".

2.2 Network Topology

Network topology describes how network devices interact with one another. Physical and logical network topologies are distinguished by Sethi & Hnatyshin. Physical topology is a representation of the nodes and the links that connect them, taking into account factors such as "the physical placements of nodes and the actual areas traversed by communication links. Otherwise, independent of the actual physical placements and distances of nodes in the network, logical topology allows for a conceptual interpretation of the communication links between them. The OPNET Modeler academic edition 17.5 Simulator" was utilized in this paper. OPNET is a simulation program that has been utilized in a variety of projects. Such a topology cannot be produced in a production network; "only simulation is possible since it gives a mathematical and graphical model of the results", which can be easily comprehended [11].

The following network devices and setup utilities make up the network topology provided in this paper:

1. Seven Ethernet Switch
2. Nine Ethernet IP Router
3. Seven 100 Base T switched LAN
4. PPP DS3 Duplex Link
5. Four Ethernet Server
6. Application configuration
7. "Ethernet 100 Base T Duplex Link"
8. Failure recovery
9. Profile configuration

As illustrated in Fig. 1, the provided network comprises of nine routers deployed throughout nine different areas in Baghdad, Iraq's capital. "The DS3 Duplex Link (data rate 44.736 Mbps) link model with the point to point (PPP) protocol is used to connect routers. There are seven Ethernet LANs, each of which is connected to an

Ethernet switch via an Ethernet switch using Ethernet 100 Base T Duplex Link. Each switch uses the same link type to connect to a corresponding router (Ethernet 100 Base T). There are four servers: one for video, one for voice, one for HTTP, and one for database [14]. These servers are linked to a switch in a central location. There is just one profile definition and one application definition". The profile definition is used to generate application layer traffic by creating user profiles in distinct network nodes. Video, voice, database, and HTTP are the four profiles that have been prepared [16] Tables 1 and 2 detail each application, whereas table 3 details the location and state of the planned failure.

2.3 IPv6

The Internet Engineering Task Force created the IPv6 address spacing system (IETF). IPv6 specifies a 128-bit or 16-byte address space scheme, "which is represented by a series of eight 16-bit fields separated by colons" [17]. Now, as an example, we'll look at the IPv6 address format:

IPv6 is superior for specifying address configuration in practically all networked communication devices. IPv6 was created to address the issue of IP address scarcity [18]. .Over IPv4, IPv6 improves and increases their offerings in the computing network. IPv6 provides a technique for "end-to-end datagram transmission over various IP networks. IPv6 is a protocol for packet-switched internet communication" [20].

IPv6 feature are given below:

a) Make the IP header simple to comprehend.
b) It improves the routing protocol's scalability and IP addressing capabilities.
c) It can provide "Specifying addresses in the near future, as well as IP device transmission via the internet".
d) It substitutes the local link by broadcasting it via multicast.
e) For security reasons, IPv6 guarantees encryption, authentication, and payload encoding.
f) It delivers superior "real-time traffic between end-to-end networks, such as VOIP, Voice, and Video, than IPv4".

"An IPv6 address is 128 bits or 16 bytes (octets) long", which is 4 times as large as an IPv4 address [22]. Multicast addresses, any cast addresses, and Unicast addresses are examples of IPv6 addresses [23]. The following is a list of global Unicast IPv6 addresses:

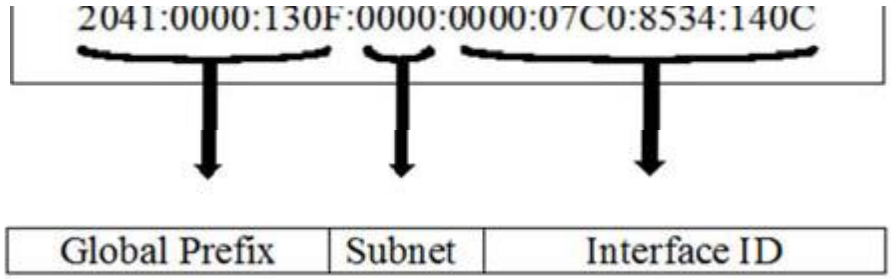

Fig. 1. IPv6 Address Format

Table 1. Global Unicast IPv6 Addresses Format

001 (3 bit current global reservation for IPv6 Global Unicast Addresses)		
Global Routing Prefix	Subnet ID	Interface Identifier
48 bits	16 bits	64 bits
Internet Routing Prefix	Bits foe sub-netting inside the organization	Interface Identifier
Network part 64 bits	Host Part 64 Bits	

"IPv6 is a 128 bits or 16 bytes addressing scheme, which is represented by a series of eight 16 bits field separated by colons. The format of IPv6 is x:x:x:x:x:x:x:x ,where x is 16 bits hexadecimal numbers with leading zeros in each x field are optional. Successive x fields with 0 can be represented as:: but only once, for example 2031:0000:0000:013f:0000:0000: 0000:0001."IPv6 features built-in security, including authentication and encryption, as well as a simplified header structure for faster processing [21].

2.4 Routing Protocols (section 2.3)

A routing protocol is a collection of rules that must be followed. It determines how people communicate with one another. Routing protocols perform a number of tasks, including determining the network's topology, determining the network's topology, and determining the network's topology. The routing table should be updated and maintained on a regular basis. Information and data exchange and communication, decision-making, and the ability to choose the optimal way [24]. For routing protocols, there are two sorts of approaches that are used:

a) Distance vector (Path vector) protocol: This is "a distance vector routing protocol" that is determined by the distance between the package's origin and destination sites.

b) Link state routing protocol: This protocol is named after the determination made using information gathered from other routers (Manzoor, Hussain & Mehrban, 2019).

This routing protocol can be classified into 2groups:

a) "Interior routing protocols: Interior routing protocols are part of a system known as an autonomous system, which is used to distribute routers among all routers within an internal border."

b) "Exterior Routing Protocols: In autonomous systems, exterior routing protocols are greatly expected (AS). In an autonomous system (AS) or organization, an exterior routing protocol is utilized for external purposes of two multiple routing transmission."

TCP (transmission control protocol) transmits data between routers at the network layer.

2.5 EIGRPv6

The "Enhanced Interior Gateway Routing System (EIGRP) is a hybrid routing protocol that improves on the Interior Gateway Routing Protocol (IGRP). EIGRP took over from IGRP in 1993 since the Internet Protocol was built to accommodate IPv4 addresses, which IGRP couldn't. Hybrid routing protocol combines the benefits of both Link-state and Distance Vector routing methods; it is based on the Distance Vector protocol" but has extra Link-State capabilities [2], Cisco's proprietary routing technology, EIGRP (Enhanced Interior Gateway Routing Protocol), is centered on the Algorithm Diffusing Update. Among the three protocols we're testing, EIGRP has the fastest router convergence [3] To achieve "faster convergence, EIGRP saves all routes rather than the optimal route. EIGRP maintains neighboring routing tables and only exchanges data" that its neighbors do not have. "EIGRP provide a number of tables used to perform routing; the neighbor table stores information about directly associated neighbor routers, the topology table stores loop free paths to destinations as well as route metrics, and successor routes, feasible successors, the final table is the Routing table which provide the lowest cost path for every network. It determine the most efficient (least cost) route to a destination."

EIGRPv6 likewise allows a router to discover different routes minus relying on other routers for updates. Link Local Addresses usage instead of an IP subnet to facilitate neighbor adjacencies. The evidence mechanism used by EIGRPv6 is the same as that used by EIGRP(Pirker & Dür, 2019). To start routing operations profitably, you must first create a router ID. EIGRP is simple to maintain and has a "low resource consumption and routing protocol. It also enables authentication and includes backup routes prepared in the form of successors and feasible successors saved in the topology table, which improves dependability (Mahmood, 2020). EIGRP is often used in large networks, and it only renews when the topology changes", rather than on a regular basis like older Distance-Vector protocols like RIP.

2.5.1 EIGRP Unchanged Features in IPv6

- It's a Cisco-only product.
- It employs the “Dual algorithm”.
- The “metric composite is same”.
- Using the multicast address FF02::A, updates are multicast.
- Verification of identity
- Percentage of link bandwidth
- Horizontally split
- Configuration of the hold time and hello interval.
- Stub router
- Variance
- “Address summarization”

2.5.2 The changed features of EIGRP in IPv6 are listed as follows (Hoang, T. D., 2015)

- Interface Configuration- “Without using the global IPv6 address, interfaces can be configured directly with EIGRP for IPv6”. In EIGRP for IPv6, there is no network declaration.
- “EIGRP for IPv6 features a shutdown feature, so you don't have to stop the routing process. In order to start running, the routing process must be in no shutdown mode”.
- Router ID- Before an “EIGRP IPv6 protocol instance” can start, the router ID must be specified.
- Route filtering- IPv6 EIGRP only uses the “distribute-list prefix-list command” to do route filtering. EIGRP does not allow route maps in IPv6.
- No notion of automated route summarizing- “EIGRP utilizes automatic route summarization in classful networks in IPv4, but there is no such concept” in IPv6 .

2.6 Implementation of EIGRP in IPv6

The “authors employed a simulation method with packet tracer software in this study. The authors of this study propose a network topology that consists of two routers, each of which is connected to a personal computer through a switch” (Iqbal & Khan, 2015). Two networks are employed in this topology, as illustrated in Fig. 2, with one network consisting of PC1, PC0, ROUTER0, and SWITCH0, and the other network consisting of PC2, ROUTER1, and SWITCH1. PC0 has the “IPV6 address 2001:11:11: 10/64, PC1 has the IPV6 address 2001:11:11: 11/64, and PC2 has the IPV6 address 2012:13:13: 13: 20/64. If PC0 wants to interact with PC1, there is no need for a router because they are both on the same network and can communicate via an intermediate device switch; however, if PC0 or PC1 wants to communicate with PC2”, a router is required because they are on separate networks. To facilitate this communication, the router must have “two interfaces: Ethernet and serial port (Narula & Aggarwal, 2014). Let Ethernet 0/0 and Serial 0/0/1 are the two interfaces on Router 0. Serial0/0/1 has IPv6 address 2010:AB8::1/64, while Ethernet 0/0 has IPv6 address 2001:11:11:11:1/64. Ethernet 0/0 and Serial 0/0/0 are the two interfaces of Router 1. Serial 0/0/0 has IPv6 address 2010:AB8::2/64, while Ethernet 0/0 has IPv6 address 2012:13:13:13:1/64”.

2.7 OSPFv3

In RFC 5340, IPv6 is listed as OSPF version 3. (2008). OSPF “(Open shortest path first) is a network layer routing protocol for Internet Protocol (IP) networks. OSPF stands for Open Shortest Path First. It is based on Dijkstra's algorithm. OSPF calculates the shortest path for a packet to travel from source to destination. OSPFv3 is a component of the Interior Gateway Routing Protocol (IGP), which operates within an Autonomous System (AS)”. It's utilized for enterprise transmission and huge network connectivity. OSPF is a protocol for transporting data in one autonomous system (AS). It is used to make routing computations using data from a “Link State Database (LSDB). The OSPF protocol employs the concept of areas. Each area in OSPF is specify with a 32 bit area ID, which are dotted decimal format and not are compatible with IPv4 addresses, area 0 is the backbone area of an OSPF which is Open

Shortest Path First of all OSPF area need to connect to this backbone area which manages all inter area routing. VLSM (variable length subnet masking)" is utilized in OSPF to reduce IP waste and achieve zero percent waste If there are any network changes, it updates quickly; else, the network updates slowly.

2.8 Main Configuration Command

These are the commands for configuring the IPv6 EIGRP protocol on routers 0 and 1, so that it can discover the shortest way and transport packets between different networks using that shortest path. The "IPv6 unicast-routing command is used to enable IPv6 forwarding This is the first command to run since after enabling IPv6, another command can be run. The router's IPv6 unicast-routing command is configured in configuration mode, and no shut command is required to begin the routing process." The following are the many router configurations:

2.8.1 Router 0 configuration hostname Router0

"!ipv6 unicast-routing//ipv6 forwarding is enabled//"
"! interface Fastethernet0/0 ipv6 address 2001:11:11:11::1/64"
"//configure IPv6 address for interface Fastethernet0/0// no shutdown// Enables no shut mode so the routing process can start running// ipv6 enable// IPv6 processing on the fast ethernet 0/0 interface// ipv6 EIGRP 10// Enables the EIGRP for IPv6 process on the fast ethernet 0/0 interface Serial0/0/1 ipv6 address FE80::1 link-local ipv6 address 2010:AB8::1/64"
"// configure IPv6 address for interface Serial0/0/1// no shutdown ipv6 enable// Enables IPv6 processing on the Serial0/0/1 interface// ipv6 EIGRP 10// Enables the EIGRP for IPv6 process on the Serial0/0/1 interface// clock rate 2000000"
"! ipv6 router EIGRP 10//EIGRP ipv6 routing protocol is enabled// router-id 2.2.2.2//Router Id is defined// no shutdown// Enables no shut mode so the routing process can start running//"
"! End".

2.8.2 Router 1 configuration

"Hostname Router0"
"!"
"IPv6 unicast-routing//ipv6 forwarding is enabled//"
"!"
"Interface Fast ethernet0/0"
"IPv6 address 2012:13:13:13::1/64"
"//configure IPv6 address for interface Fastethernet0/0//"
"No shutdown// Enables no shut mode so the routing process can start running//"
"IPv6 enable// IPv6 processing on the fast ethernet 0/0 interface//"
"IPv6 EIGRP 10// Enables the EIGRP for IPv6 process on the fast ethernet 0/0 interface"
"Interface Serial0/0/1"
"IPv6 address FE80::2 link-local"
"IPv6 address 2010:AB8::2/64"
"// configure IPv6 address for interface Serial0/0/1//"
"No shutdown"
"IPv6 enable// Enables IPv6 processing on the Serial0/0/1 interface//"
"IPv6 EIGRP 10// Enables the EIGRP for IPv6 process on the Serial0/0/1 interface//"
"Clock rate 2000000"
"!"
"IPv6 router EIGRP 10//EIGRP IPv6 routing protocol is enabled//"
"Router-id 1.1.1.1//Router Id is defined//"
"No shutdown// Enables no shut mode so the routing process can start running//"
"!end"

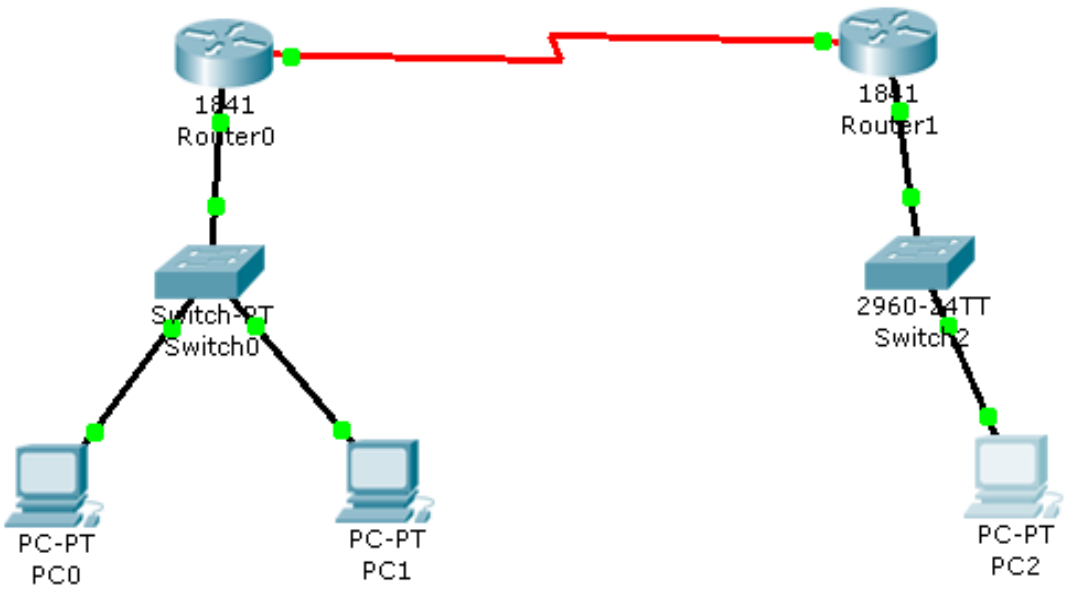

Fig. 2. Implemented topology for performance evaluation

3. MATERIALS AND METHODS

All Performance analysis of OSPFV3 and EIGRP in applications in IPV6 related publication was collected from Scopus database on a single day online (Samaan, 2018). The documents were published from 2016 to 2021.Searching the Scopus database yielded a comprehensive study. I used to look for articles that were published between 2016 and 2021. In this study, only review papers and original research published in UK were considered. For the analysis, VOSVIEWER 1.6.16 was employed. The "work is divided into two scenarios in order to achieve the project's goals. The first scenario involves the creation of an IPv6 network model using OSPFv3(Wai, 2019). The second scenario is a replica of the first, but with IS–IS enabled. The impact of employing each routing protocol separately to route the selected applications" is seen and documented in the two scenarios (Albaour & Aburawi, 2021). The performance of both routing protocols was assessed using the quantitative metrics described in section 1.2. Riverbed Modeler Academic Edition was used for the simulation and analysis of the results.

3.1 Experiment Scenarios

Two test scenarios was constructed to examine EIGRPv6's and OSPFv3's performance in order to conduct a comprehensive and thorough comparison.

"Test Scenario 1 implements a four-router point-to-point test scenario", as shown in Fig. 3. The goal of this scenario is to see how well both protocols work once the routers are directly connected to each other rather than through a switch.

Fig. 4 also shows the 2nd scenario that was developed to test EIGRPv6 and OSPFv3. In contrast to Scenario 1, which uses a point-to-point topology, "Scenario 2 uses a LAN environment in which all routers are connected to a switch. The switch will be configured with two VLANS in Scenario 2 to ensure that traffic for each interface is isolated and kept in its own subnet". As a result, unlike Scenario 1, where each router has its own subnet, the routers in Scenario 2 will share a "single subnet (one for the primary and one for the secondary connection), allowing an evaluation of OSPFv3 and EIGRPv6 performance in a LAN context. A Loopback interface will also be created on routers R1 and R4 so that an active interface is always available to send and reply to ICMP Ping packets. By establishing Loopback addresses on R1 and R4, traffic can be routed" via a different channel if a link in the topology fails. For the purposes of this study, it should be highlighted that every test will be monitored and run from the

perspective of R4, with FA0/1 as the preferable interface to R2.

3.2 Scenario Results and Analysis

The findings of testing EIGRPv6 and OSPFv3 and their security procedures in first and second Scenarios will be discussed in this section. The following are the outcomes:

Regardless of the test scenario, EIGRPv6 startup timings are much faster than OSPFv3 startup times, as demonstrated in Fig. 5. However, when "compared to its outcome in Scenario 1 (P2P), EIGRPv6 took longer to start up in the Scenario 2 (LAN) test environment. Furthermore, while EIGRPv6 performed poorly in Scenario 2, OSPFv3 fared marginally better, and even better when its IPSec encryption" method was activated (see Fig. 5). The MD5 authentication mechanism in EIGRPv6 had an influence on the "protocols performance in Scenario 1, but had no effect in Scenario 2".

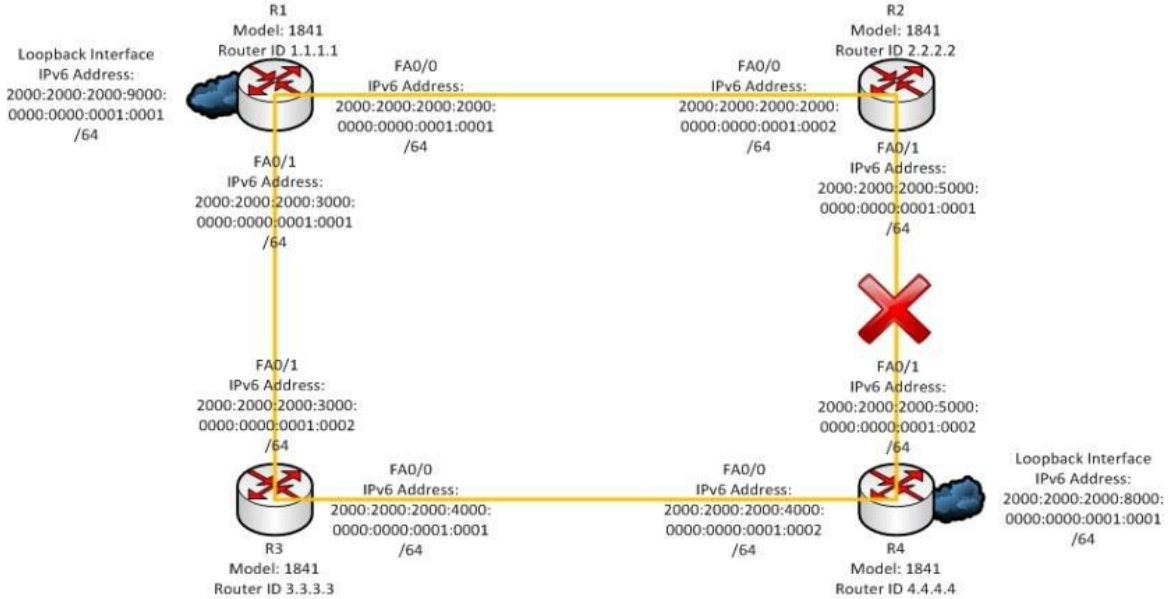

Fig. 3. Test Scenario 1

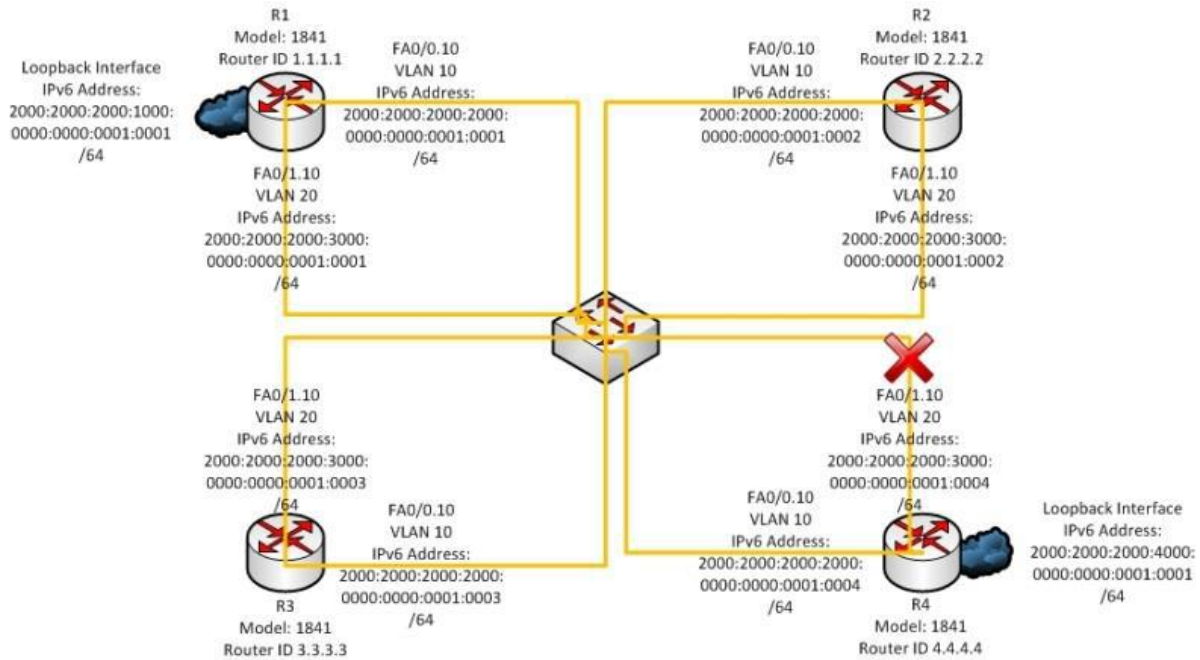

Fig. 4. Test Scenario 2

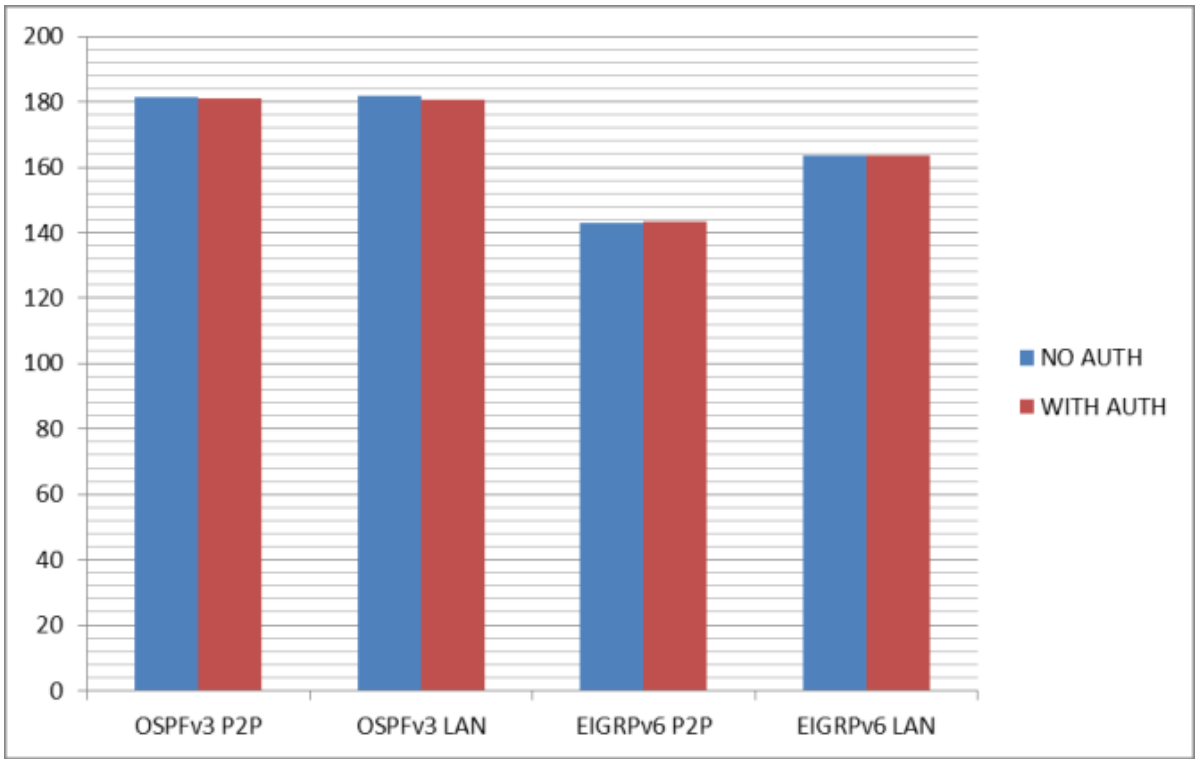

Fig. 5. EIGRPv6 and OSPFv3 Cold Start-up Time Comparison

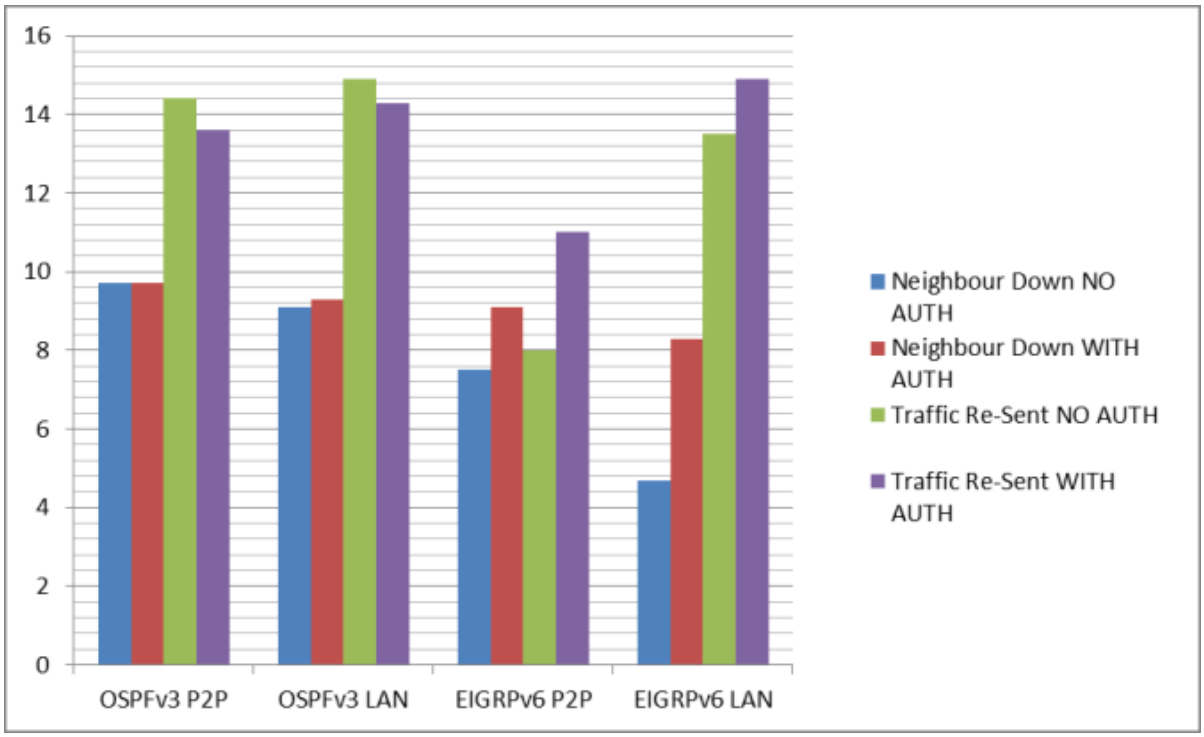

Fig. 6. EIGRPv6 and OSPFv3 Re-Convergence Times

"The second and third goals of this paper's methodology are to evaluate OSPFv3 and EIGRPv6's ability to recover from unexpected failures and to determine which protocol re-converges with the fewest packet drops. As a result, the averaged findings from the

convergence tests conducted" in this study are shown using the data in Table I, as well as Figs. 6 and 7.

4. DATA ANALYSIS

Fig. 7 show co-authorship and country. Common frameworks conceptual analysis related with Performance analysis of OSPFV3 and EIGRP in applications in IPV6 for analysis of articles index in scopus between 2016 and 2021 by applying the Corresponding method analysis. The 117 terms of retrieved articles clustering reflecting concepts frequently linked together. United Kingdom has relationship with grace, Jordan, Canada, Tunisia, France, and Malaysia. Network Analysis VOSviewer specializes in network analysis of bibliometric data. Unlike most other visualization tools, no data cleaning is required; instead, bibliometric data can be downloaded directly from different journal databases. VOS viewer displays the best ten influential and active nations in publishing documents that are malnutrition-related, as assessed by applying the Corresponding Analysis and Factorial Analysis approach, with 5groups of 7, 79, 1,6, and 7components showing research replies focusing on "gene-expression." The top ten most active countries contributed to the publication of a total of (48.35 percent).USA had the highest percentage of malnutrition publications (19.28%), the next is England (98%), Brazil (4.33%), and India (4.33%). Other countries that were leading in research throughout the study period included France, Australia, Canada, China, Spain, and Japan, which were also in the best ten active and productive nations.

4.1 General Characteristics of Study

Table 2 shows that six authors have at least three papers, with the maximum citation being 47 and the minimum citation being 11. "The size of a circle represents an author, quantity of publications, and co-authorship strengths, based on a threshold where only the authors with at least five documents are displayed in table 1 and each circle, the size of a circle represents an author, quantity of publications, and co-authorship strengths". The-index is a typical metric that seeks to assess a scientist's or scholar's productivity as well as the effect of their published work. It was designed to be a fair approach to compare persons within a discipline, particularly in the sciences. Scopus is where you'll find the h-index. Because it is generated based on the citations indexed by each, your h-index may change depending on which of these resources you consult.

From Table 3 above, there are 10 countries and each country has at least 5 documents and the country with the maximum citation is 172 and which is United Kingdom, followed by china with 132, France with 99, Italy 87, South Korea 78, India 51, Iraq 45, United States 32 and Malaysia with 5 citations. According to the Table, United Kingdom has the highest citation with least document published. Also, India has higher documents published but low citation.

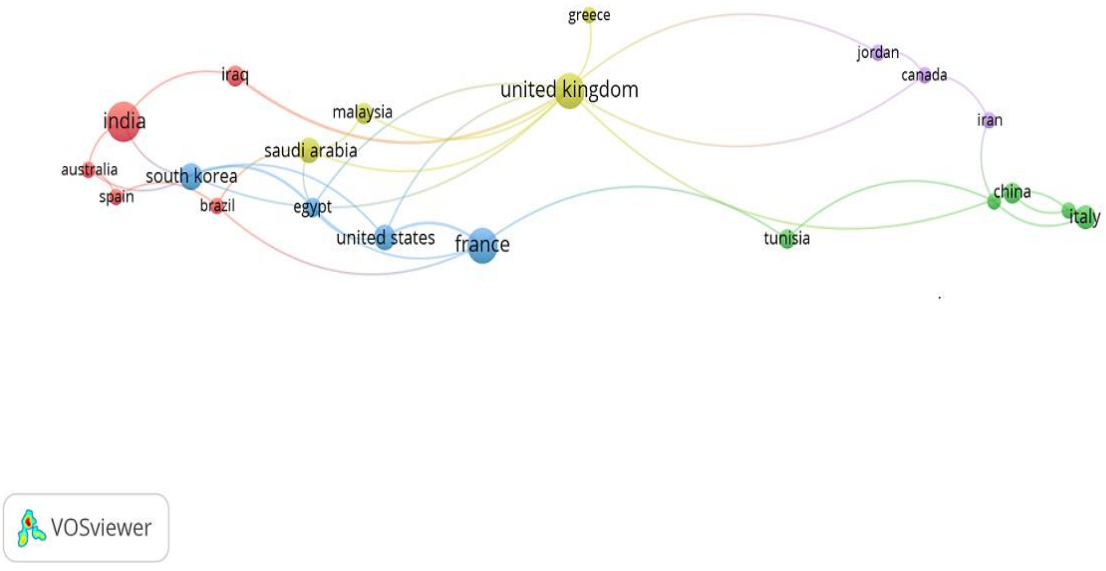

Fig. 7. Co-authorship and country

Table 2. List of authors and their citations

Selected	Author	Documents	Citations	Total link strength
☑	benamar n.	3	47	2
☑	lamaazi h.	3	47	2
☑	ghaleb b.	3	35	0
☑	koutsiamanis r.-a.	3	10	0
☑	montavont n.	5	15	0
☑	papadopoulos g.z.	4	11	0

Table 3. Citations recorded for countries

Selected	Country	Documents	Citations	Total link strength
☑	italy	6	87	8
☑	south korea	8	78	7
☑	india	17	51	6
☑	saudi arabia	7	37	6
☑	france	14	99	4
☑	united kingdom	14	172	4
☑	china	5	132	3
☑	iraq	5	45	0
☑	malaysia	5	5	0
☑	united states	7	32	0

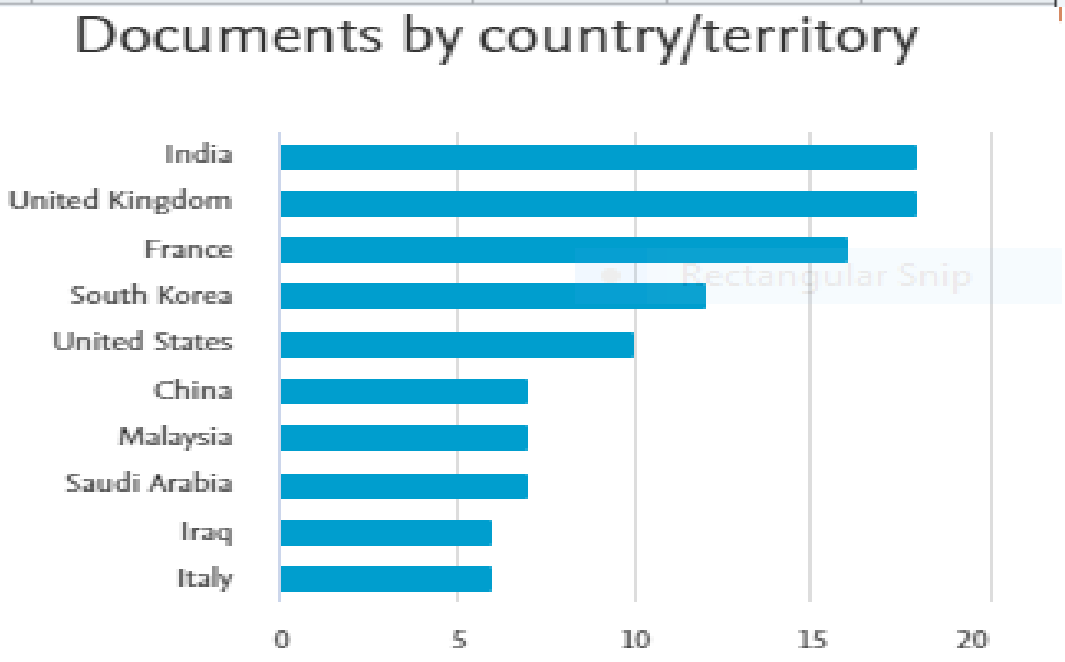

Fig. 8. country and their documents

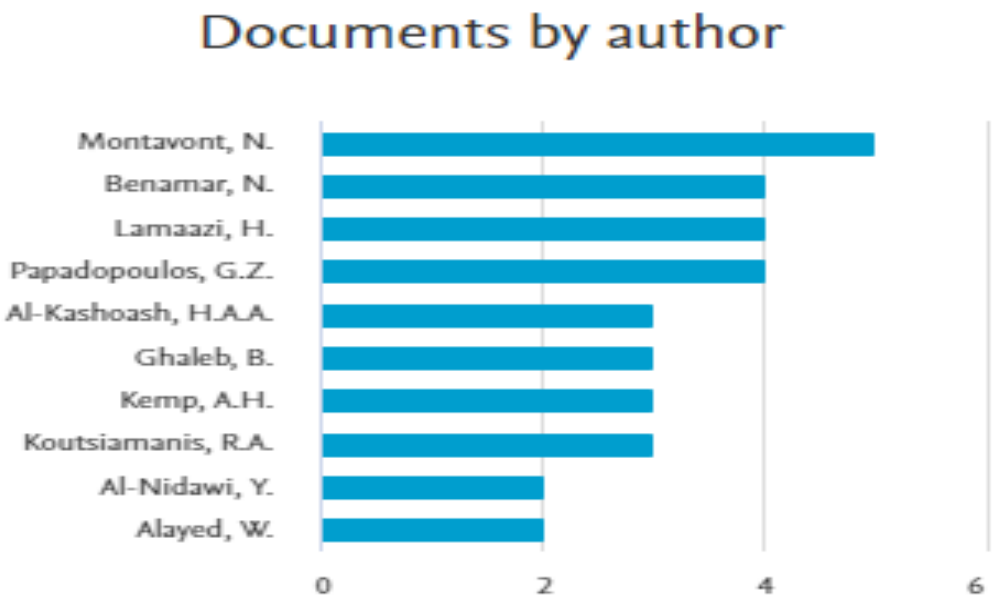

Fig. 9. Authors and their number of documents published

Fig. 8 shows country and their documents. India is with the maximum document and Italy is the country with minimum documents. According to the figure above, United Kingdom has the second position. France is third in the number of documents published. South Korea is fourth and United States is fifth. The sixth position is china and the seventh position is Malaysia. Saudi Arabia is the eighth position, followed by Iraq and Italy has least document published between 2016 and 2021.

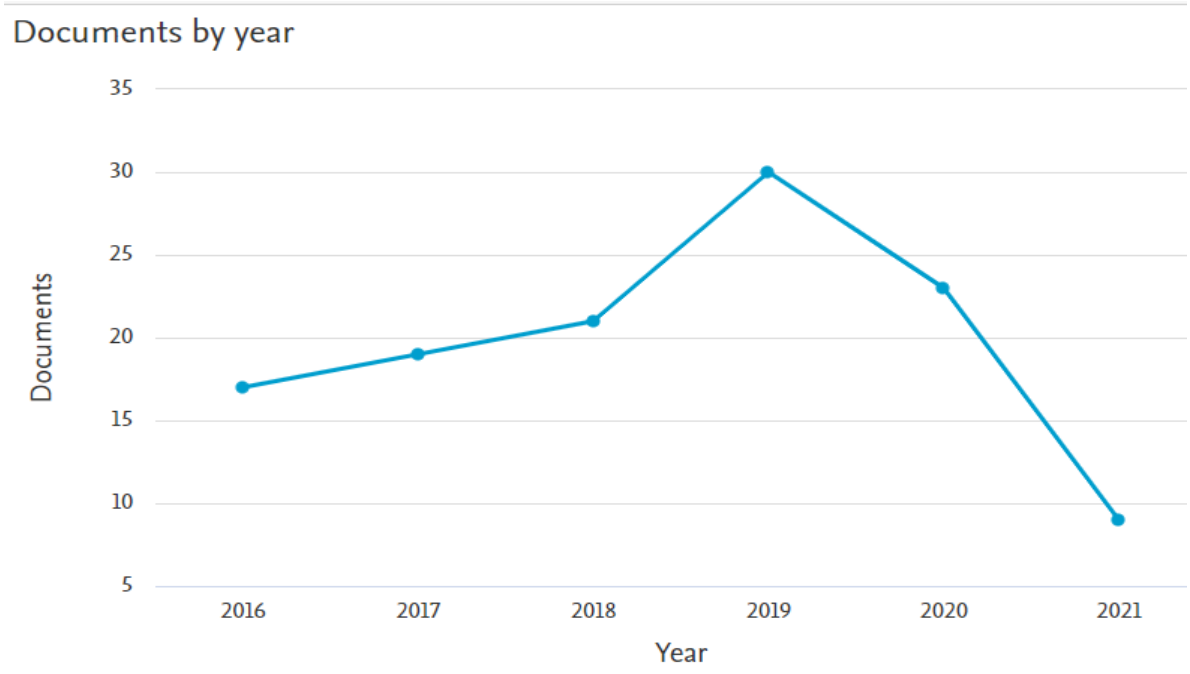

Fig. 10. The number of documents and the year the document was published

Fig. 9 shows Authors and their number of documents published. Montavont, N has the highest documents and Alayed, W. has the least documents. From the analysis of the document published by the author, Benamar, N has the second highest documents published. Lamaazi, H. and Papadopoulos, G.Z has third and fourth respectively. The fifth Author that has highest document published is Al-kashoash, H.A.A. the sixth position is Ghaleb, B and seventh position is kemp, A.H. Koutsiamanis, R.A. and Al-Nidawi, Y have eighth and ninth respectively.

Fig. 10 shows the number of documents and the year the document was published. The year 2019 has the highest documents publication and 2016 has the least document publication. VOSviewer software was used to study and visualize network analysis of co-authorship. For data visualization and frequency analysis, bibliometrics were employed. Correlation to analyze the link between variables, coefficients between variables were calculated. There are 10 countries and each country has at least 5 documents and the country with the maximum citation is 172 and which is United Kingdom, followed by china with 132, France with 99, Italy 87, South Korea 78, India 51, Iraq 45, United States 32 and Malaysia with 5 citations. According to the Table, United Kingdom has the highest citation with least document published. Also, India has higher documents published but low citation [25,26].

4.2 Methodology /Research Design

Modeling and simulation using packet tracer will be design of the study. The results of simulation will be analyzed in the study. The work is into 2settings to achieve the project's goals. The first scenario involves IPv6 model network creation using OSPFv3. The 2ndsetting is the first replica, nonetheless with IS–IS enabled. The effect of employing individual protocol routing distinctly to path the applications selected is seen and documented in the two scenarios. Both protocols routing's performance was assessed using the quantitative metrics described in section 1.2. Riverbed Modeler Academic Edition was used for the simulation and analysis of the results.

5. CONCLUSION

The report gives a yearly summary of the global 2protocols routing's performance (IS–IS and OSPFv3) for IPv6. Research output, institution, journal, authors, and nations have all been measured and compared. Citation counts are frequently recognized as one approach for gaining a quantitative expression of the utilization and contribution of a given published paper, and information professionals are relied on to identify how best to quantify the influence of an author's works.

Every network design must have an appropriate routing protocol for implementation. Several considerations must be made during routing protocol implementation to choose the optimum deployment protocol. When there are multiple routing protocols available, these judgments are usually made based on some parameters of quantitative used to decide which protocol would do better than the others. The protocol routing that performs well regarding these factors is chosen for deployment and is deemed most appropriate.

Two IPv6 protocols routing's performance (IS–IS and OSPFv3) in this project, was assessed and compared using simulations for a variety of applications such as ftp, email, database, remote access, and http. Matching these protocols' goal is to determine whether one is better for routing certain applications on IPv6 networks. About 8 parameters were analyzed for applications selected to determine which of the 2 protocols will be better appropriate for routing the apps selected. Upload response times and ftp download, database query response time, remote login, ftp traffic received and database query, email download response times, and http page are among the criteria. Results of simulation reveal that, for all of these parameters, IS–IS is the top choice between the 2 protocols regarding reaction time. Because OSPFv3 took longer to converge, the network speed in this case has been impacted, and "the time to reach each application server is now slower than the time to access each server in the IS–IS network. Based on database query and ftp traffic received, simulation results showed that OSPFv3 is better than IS–IS since the OSPFv3 network received the most database and ftp traffic. Because the greatest throughput values were recorded in its network, OSPFv3 was able to send and receive more application traffic, and as a result, this has an effect on the total quantity of application traffic received by OSPFv3". Despite the fact that OSPFv3 has transmitted and received more traffic than IS–IS, routing protocol speed is an essential performance measure since it affects network speed. Based on these findings, it can be concluded that IS–IS

outperformed OSPFv3 in terms of overall performance.

DISCLAIMER

The products used for this research are commonly and predominantly use products in our area of research and country. There is absolutely no conflict of interest between the authors and producers of the products because we do not intend to use these products as an avenue for any litigation but for the advancement of knowledge. Also, the research was not funded by the producing company rather it was funded by personal efforts of the authors.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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