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An Analysis on Redistribution of Routing Protocols

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Abstract: Designing an IP network, requires a deep knowledge of both infrastructure and the performance of the device that are used at the same time how packets are handled by the devices. In networking infrastructure where there are multiple branches with lots of redistribution points, performance are the very important thing that a network designer should consider. A company can have different branches, where those branches use different routing protocols. Branches of the company should communicate with each other. The existence of multiple routing protocols in different branches will require redistribution those protocols so that routes from one routing protocol can be advertised in to another routing protocol.

The main issues, which can affect the performance of a network are the result of improper redistribution. These issues which affect the network performance are excessive routing updates, suboptimal routing and routing loop, which can lead to network downtime.

This paper discusses the issues of network performance. It explains how to overcome these issues using different path control tools. The author of this paper decided to present some of the network performance issues and also give a solution to these issues.

Keywords: IGP, EGP, OSPF, RIP, IGRP

I. INTRODUCTION

Routing protocols are used in a network for transferring the data using efficient route. Routing protocol helps to select the best route from the network for transferring the data from source to target. It finds the best possible route which should be more optimal, cost and time for sharing the data from source to target with in a network. These routing protocols are useful:-

A. For the selection of best possible route for data sharing.
B. It finds all the possible routes from source to target in a network.
C. How the devices of the network will communicate to each other, this is decided by it.
D. These routing protocols find the network's topology.
E. For synchronization, all routers shared their routing table with their neighbors.

Redistribution of routing protocol is a technique in which we select a path from one routing protocol and use it for the another protocol. Redistribution is a process of transferring the routing information from one routing domain to another. The use of routing protocol to advertise routes that are learned by some other means, such as by another routing protocol, static routes, or directly connected routes, is called redistribution. While running the single routing protocol throughout your entire IP interwork is desirable, multi protocol routing is common for a number of reasons such as company merges multiple departments managed by multiple network administrators and multi vendor environments. Running different routing protocols is often part of a network design.

II. NEED OF REDISTRIBUTION

We need redistribution of routing protocols for connecting two different networks. When we connect one network which is using one routing protocol for data sharing with another network which is using a different routing protocol from the first one network then we need redistribution method for the connectivity of these networks with each other for data sharing purpose. If we will not use this redistribution concept then these networks will not share their route information with each other. They will share their information only with those networks which are using the same routing protocol. The goal of redistribution is to provide full connectivity between different routing domains. Usually, redistribution is needed when you merge two networks or migrate your network from one routing protocol to another.

III.ROUTERS

A router is a device that forwords data packets across computer network. Routers perform the "data traffic directly" functions on the internet. A router is connected to two or more data lines from different network. When data comes in on one of the data line, the router reads the address information in the packet to determine its ultimate target. Router operates at the network layer of OSI model and does not broadcast the data packets.

Fig.1. Router

IV. ROUTING PROTOCOLS

Routing is a processor technique to identify the path from one network to another. Routers does not really care about hosts. They only care about network and the best path to each network. To route the packet router must know the following things:-

1) Target network
2) Possible numbers of routes to reach the destination
3) Best route to reach the target
4) How to maintain and verify the routing information

There are basically two types of routing protocols which used in internet are the following:-

A. Interior Gareway Protocols (IGPs)

Interior gateway protocols are used to exchange routing information with routers in the same autonomous system numbers. Routing which is performed with in a single autonomous system is known as interior routing. The protocols that are used to perform this type of routing are known as interior gateway protocol. These protocols are the following:-

1) RIPv1 (Routing Information Protocol Version1)
2) RIPv2 (Routing Information Protocol Version2)
3) EIGRP (Enhanced Interior Gateway Routing Protocol)
4) OSPF (Open Shortest Path First)
5) IS-IS (Intermediate System to Intermediate System)

B. Exterior Gareway Protocols (EGPs)

Exterior gateway protocols are used to communication between different autonomous systems. Protocols that used to do this type of routing are called exterior gateway protocol. An autonomous system is a collection of networks under a common administrative domain which basically means that all routers sharing the same routing table information.

V. OPEN SHORTEST PATH FIRST

Open shortest path first routing protocol is designed for large or very large networks while RIP is build to work in smaller networks. It offers several advantages over RIP, specially significant in large networks.

1) Routers calculated with open shortest path first are always loopfree.
2) Open shortest path first can scale much more easily than RIP.
3) Reconfiguration for network topology changes is faster.

Open shortest path first (OSPF) is an open standards routing protocol that has been implemented by a wide variety of network vendors. This works by using Dijkstra Algorithm. First of all a shortest path tree is constructed and then the routing table is constructed with the resulting best paths. Open shortest path first converges quickly, although perhaps not as quickly as EIGRP and it supports multiple equal cost routes to the same target but unlike EIGRP it only supports IP routing. Open shortest path first (OSPF) is an IGP protocol. It is a linkstate routing protocol. It is supported by many operating systems. Its hop count limit is unlimited. It is classless routing protocol. By default the highest IP address of interface will be elected as router id. Following are the features that provided by Open shortest path first (OSPF).

a) It minimizes routing update traffic
b) It allow scalability
c) It has unlimited hop count
d) It allows multivendor deployment

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VI. ROUTING INFORMATION PROTOCOL (RIP)

Routing information protocol is a true distance vector routing protocol. It is a Inter Gateway Protocol (IGP). It sends the complete routing table out to all active interface every 30 seconds to its immediate neighbor. Routing information protocol provides the following features.

A. RIPv1 and RIPv2 with the ability to configure individual network cards with separate versions.
B. Calculations used to avoid routing loops and speed recovery of the network whenever topology changes occur.
C. Peer filters which allow control over which router announcements are accepted.
D. It has simple password authentication support but there are significant drawbacks which makes RIP is poor if not unusable solution for large networks.

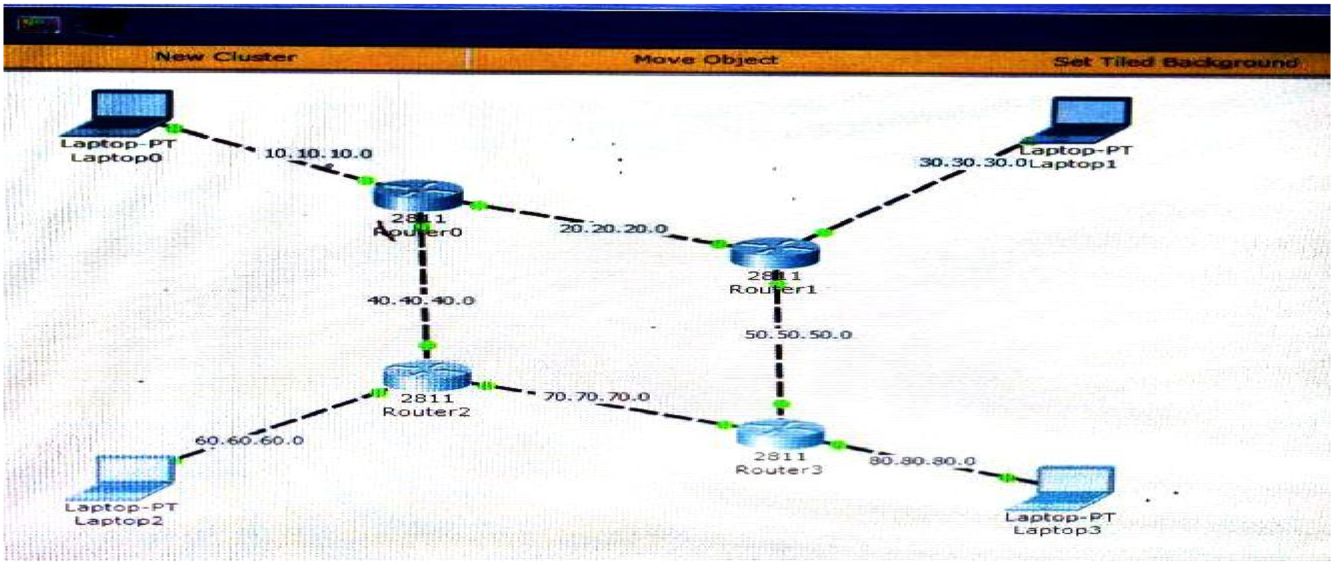

Fig.2.Configuration example RIP routing

VII. AVOIDING PROBLEMS DUE TO REDISTRIBUTION

On administration distance you saw how redistribution can potentially cause problems such as below optimal routing loops or slow convergence. Avoiding these types of problems is really quite simple never announce the information originally received from routing process X back in to routing process X.

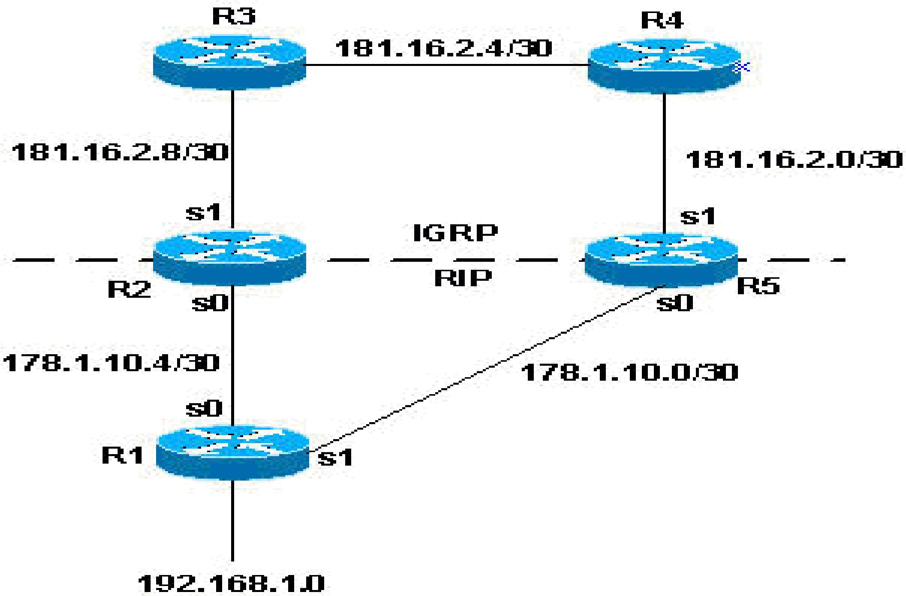

Fig.3.Avoiding problems due to redistribution

In the previous topology R_2 and R_5 are doing mutual redistribution. RIP is being redistributed in to IGRP and IGRP is being redistributing in to RIP, as this configuration shows.

R2:
routerigrp 7
retwork 181.16.0.0
redistribute rip metric 11111
router rip
network 178.1.0.0
redistributeigrp 7 metric2
R5:
routerigrp 7
retwork 181.16.0.0
redistribute rip metric 11111
router rip
network 178.1.0.0
redistributeigrp 7 metric2

with the previous configuration you have the potential for any the problems previously described. In order to avoid them you can filter routing update as follows

R2:
routerigrp 7
retwork 181.16.0.0
redistribute rip metric 11111
distribute-list 1 in S1
router rip
network 178.1.0.0
redistributeigrp 7 metric2
access-list 1 deny 192.168.1.0
access-list 1 permit any
R5:
routerigrp 7
retwork 181.16.0.0
redistribute rip metric 11111
distribute-list 1 in S1
router rip
network 178.1.0.0
redistributeigrp 7 metric2
access-list 1 deny 192.168.1.0
access-list 1 permit any

The distributed lists added to the configuration as shown above, filter any IGRP updates that come into the serial 1 interface of the routers.

If the routers in the updates are permitted by access-list1, the router accepts them in the update, otherwise it does not. In the e.g. the routers are being told that they should not learn network 192.168.1.0 through the IGRP updates, they receive on their serial 1 interface.

Therefore the only knowledge these routers have for network 192.168.1.0 is through RIP from R1. Also keep in mind that in this case it is not necessary to use the same filter strategy for the RIP process because RIP has a higher administrative distance than IGRP. If routes that originate in the IGRP domain were feedback to R1 and R5 through RIP, the IGRP route would still take precedence.

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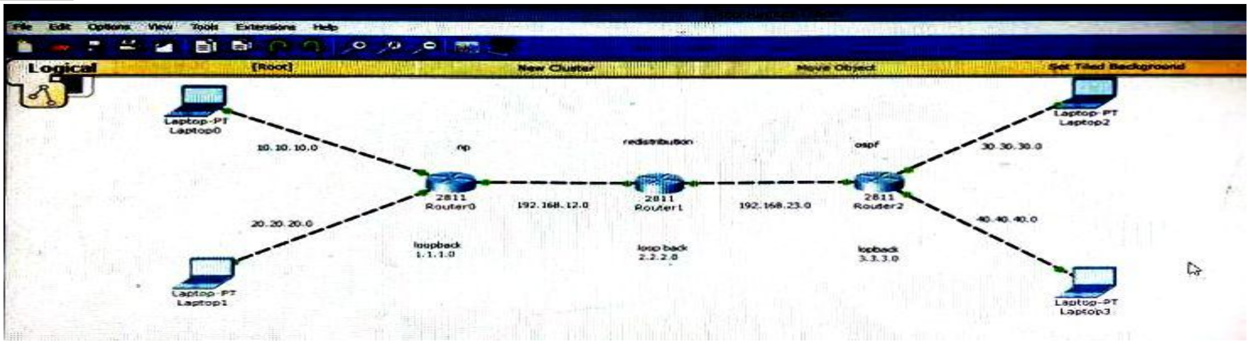
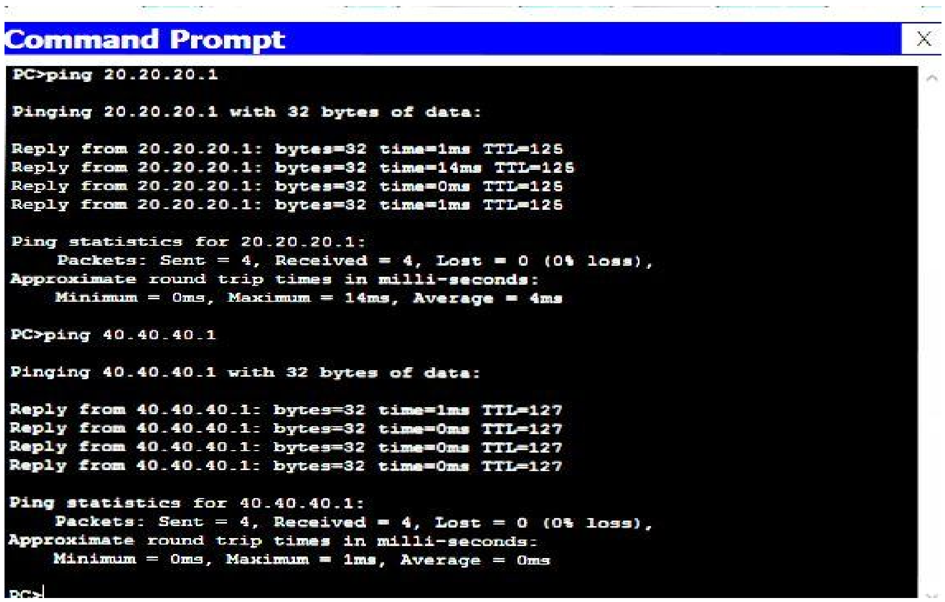


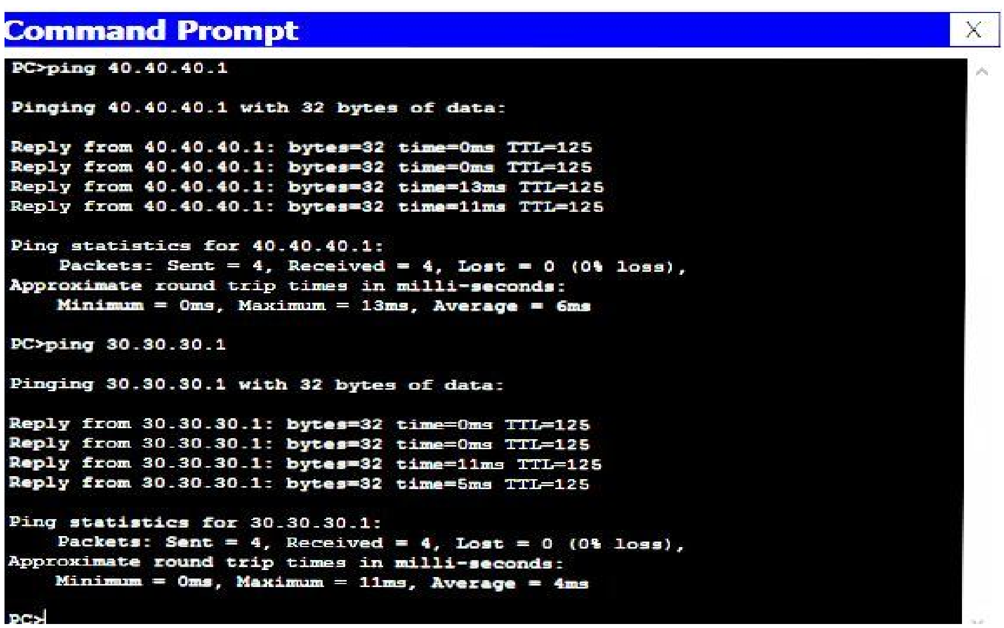
Fig.4.Redistribution of RIP and OSP

VIII. CONCLUSION



```
Command Prompt
PC>ping 20.20.20.1

Pinging 20.20.20.1 with 32 bytes of data:

Reply from 20.20.20.1: bytes=32 time=1ms TTL=125
Reply from 20.20.20.1: bytes=32 time=14ms TTL=125
Reply from 20.20.20.1: bytes=32 time=0ms TTL=125
Reply from 20.20.20.1: bytes=32 time=1ms TTL=125

Ping statistics for 20.20.20.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 14ms, Average = 4ms

PC>ping 40.40.40.1

Pinging 40.40.40.1 with 32 bytes of data:

Reply from 40.40.40.1: bytes=32 time=1ms TTL=127
Reply from 40.40.40.1: bytes=32 time=0ms TTL=127
Reply from 40.40.40.1: bytes=32 time=0ms TTL=127
Reply from 40.40.40.1: bytes=32 time=0ms TTL=127

Ping statistics for 40.40.40.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 1ms, Average = 0ms

PC>
```

Fig.5.a. Transferring data by first system



```
Command Prompt
PC>ping 40.40.40.1

Pinging 40.40.40.1 with 32 bytes of data:

Reply from 40.40.40.1: bytes=32 time=0ms TTL=125
Reply from 40.40.40.1: bytes=32 time=0ms TTL=125
Reply from 40.40.40.1: bytes=32 time=13ms TTL=125
Reply from 40.40.40.1: bytes=32 time=11ms TTL=125

Ping statistics for 40.40.40.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 13ms, Average = 6ms

PC>ping 30.30.30.1

Pinging 30.30.30.1 with 32 bytes of data:

Reply from 30.30.30.1: bytes=32 time=0ms TTL=125
Reply from 30.30.30.1: bytes=32 time=0ms TTL=125
Reply from 30.30.30.1: bytes=32 time=11ms TTL=125
Reply from 30.30.30.1: bytes=32 time=5ms TTL=125

Ping statistics for 30.30.30.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 11ms, Average = 4ms

PC>
```

Fig.5.b. Transferring data by second system

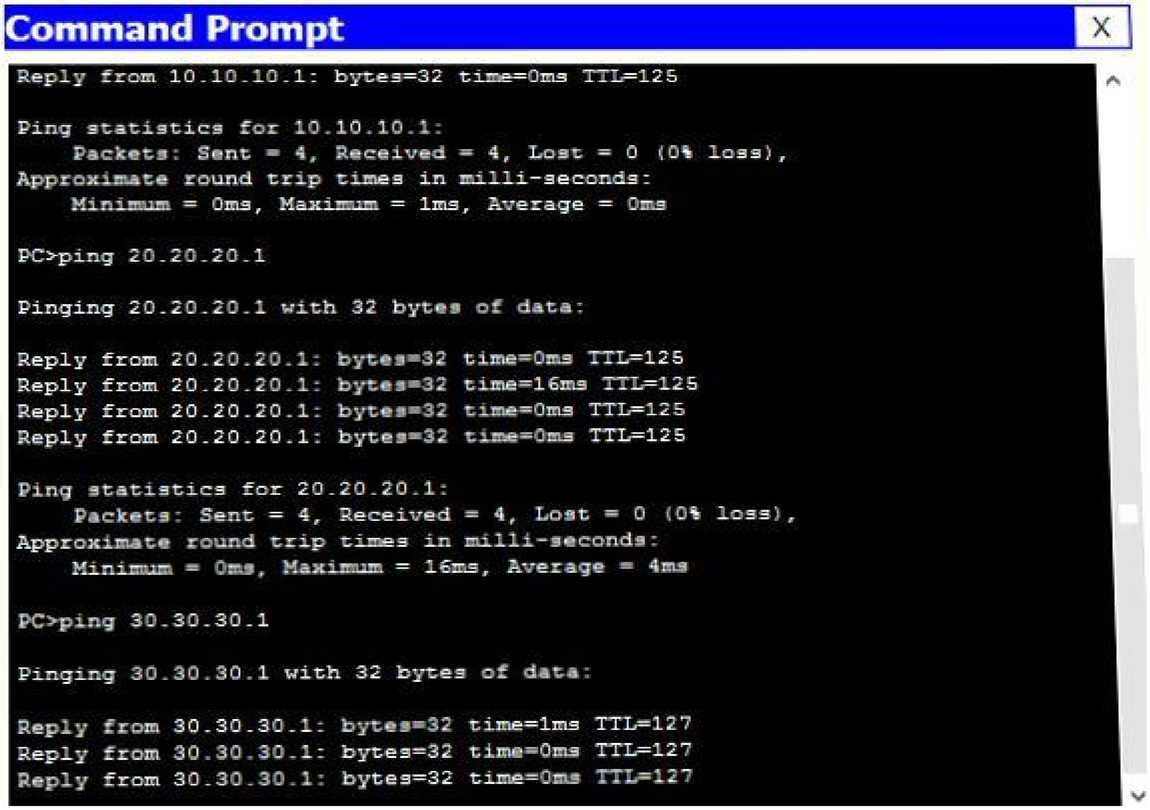


Fig.5.c. Transferring data by third system

In redistribution process all systems are transferring their data successfully, so it shows that redistribution is successful.

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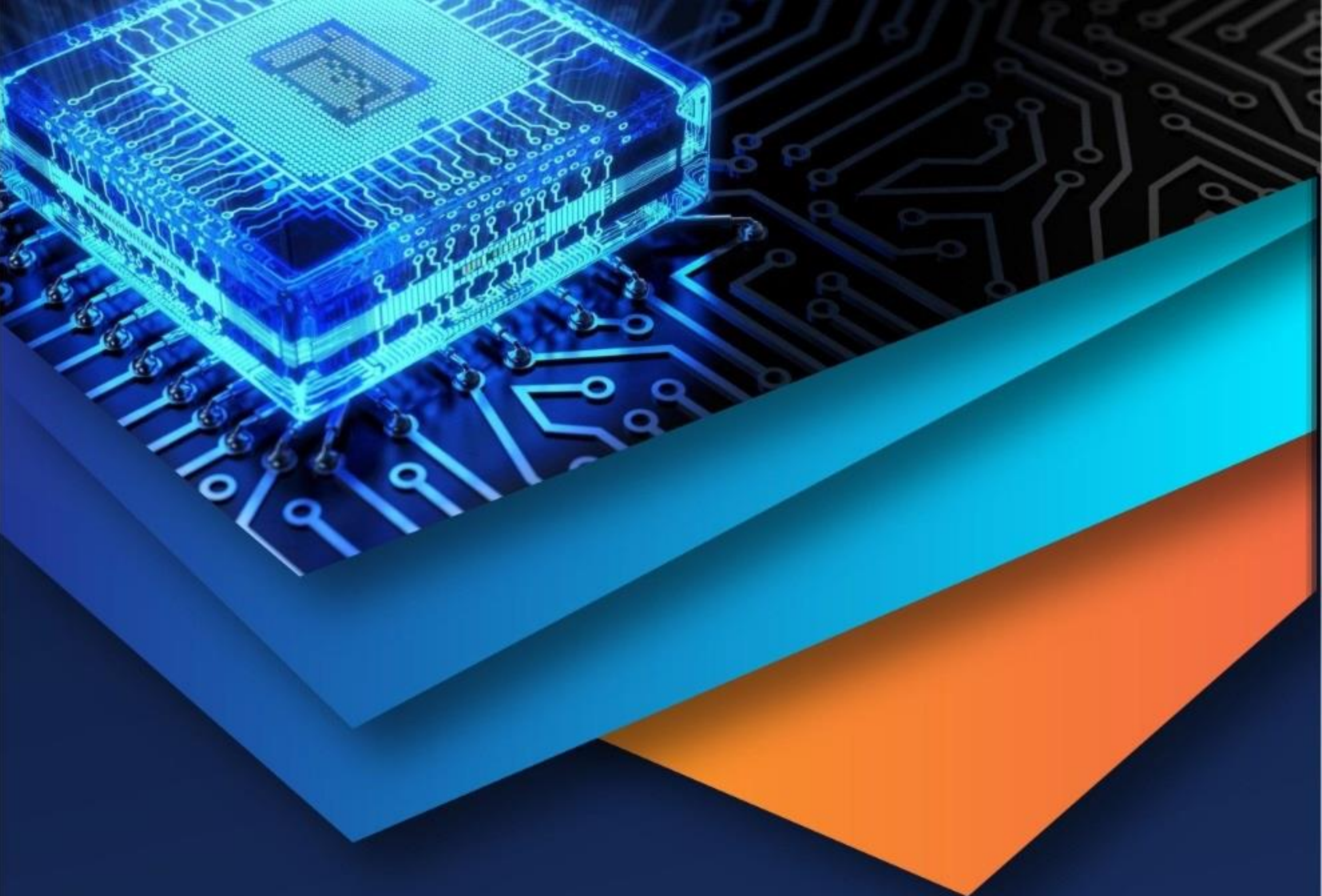

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