

ASSIGNMENT - 5

AIM : VLAN, OSPF, NAT.

PROBLEM STATEMENT : USING A NETWORK SIMULATOR
CONFIGURE VLAN, OSPF AND NETWORK ADDRESS
TRANSLATION.

THEORY :

• VLAN :

- VLAN is a logical grouping of N/w devices.
- When we create VLAN, we break large broadcast domain in smaller broadcast domains.
- Different VLANs require routers to communicate.

• ADVANTAGES OF VLAN :

- Solve broadcast problem
- Reduce size of broadcast domains
- Allow to add additional security layer
- Make device management easier.
- Allow to implement the logical grouping of devices by function instead of location.
- VLAN member

VLAN MEMBERSHIP:

- VLAN membership can be assigned to a device by one of the 2 methods:
- Static :**
 - Manually assign VLAN to switch port.
 - VLANs configured in this way are usually known as port-based VLANs.
 - Dynamic :**
 - VLANs are assigned to port automatically depending on the connected devices.
 - We need to configure one router switch from N/w as server.

TYPES OF VLAN CONNECTIONS :

Switch supports 2 types of VLAN connections:

- Access Link:**
 - Switch port is connected with a device that has a standardised Ethernet NIC.
 - access link connection can only be assigned with single VLAN. All devices connected to this port will be in same broadcast domain.
- Trunk Link:**
 - Switch port is connected with a device that is capable to understand multiple VLANs.
 - Usually used to connect two switches or switch to router.
 - Trunking allows to send or receive VLAN information across the N/w.

- SPANNING TREE PROTOCOL (STP):
 - Layer 2 protocol used for removing loops.
 - To remove loops, STP disables ports that are causing it.
- OSPF:
 - OSPF routers share neighbourhood information only with neighbours.
 - OSPF uses hello packets to discover neighbours in segments

• OSPF NEIGHBOURSHIP REQUIREMENT:

Following values must match on both routers:

- i. area ID
- ii. authentication
- iii. Hello & Dead intervals
- iv. Stub flag
- v. MTU size.

i. AREA ID:

OSPF creates a logical boundary for routing information. area is associated with specific interface, not entire router.

ii. AUTHENTICATION:

OSPF allows to configure password for specific areas. Routers should have same password to become neighbours.

iii. HELLO PACKETS AND HELLO INTERVAL:

- Hello packets are LSAs used to discover neighbours in same segment.
- Default hello interval is 10 sec.

iv. DEAD INTERVALS:

- Dead interval is the no. of seconds that a router waits for hello packet from neighbour before declaring it dead.
- Default dead interval is 40 sec.

v. STUB AREA FLAG:

- Indicates whether sending router belongs to stub area or not. Neighbours should have same stub area flag.

• OSPF NEIGHBORSHIP STATES:

7 states while building neighborships with other routers:

- i. Down state
- ii. Attempt / Init state
- iii. Two ways state
- iv. Exstart state
- v. Exchange state
- vi. Loading state
- vii. Full state.

- ADVANTAGES OF OSPF :
 - Supports both IPv4 & IPv6.
 - Supports load balancing with equal cost routes for same destination.
 - Classless protocol
 - Supports unlimited hop counts.

- DISADVANTAGES OF OSPF :
 - Requires extra CPU process to run SPF.
 - Requires more RAM
 - More complex to set up.

- NETWORK ADDRESS TRANSLATION (NAT) :

- We often need address translation, such as a org doesn't have sufficient IP public IP addresses & wants to connect to the internet.
- NAT is the process of translating IP addresses.
- It can be performed at firewall, server or router

- TYPES OF NAT:

- i. STATIC NAT:

- Manually map each inside local IP addresses

with inside global addresses. One-one mapping.

ii. DYNAMIC NAT:

Create a pool of inside global addresses & let NAT device map inside local IP with available outside global address from pool automatically.

iii. PORT ADDRESS TRANSLATION (PAT):

- Single global IP address is mapped with multiple inside local IP addresses using source port address. Also known as NAT over load.
- ADVANTAGES OF NAT:
 - Solves IP overlapping issue
 - Hides internal IP structure from external world
 - Allows us to connect with any n/w without changing IP address.

• DISADVANTAGES OF NAT:

- Adds additional delay in n/w
- End to end IP traceability won't work
- Hides actual end device

• CONCLUSION:

We configured VLAN, OSPF & NAT.