

SIMATS ENGINEERING THANDALAM

ASSIGNMENT-03

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COMPUTER NETWORKS
FOR COMMUNICATION
- DEPARTMENT : B.E COMPUTER SCIENCE
AND ENGINEERING
- SUBMISSION DATE : 26/07/2025
- TOPIC : SCALABLE IP NETWORK.
DESIGN FOR EXAM CENTRES
WITH VLSM AND SECURE OSPF ROUTING

SIMATS ENGINEERING

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CSA0735 : COMPUTER NETWORKS

REGISTERED NUMBER	NAME	SCENARIO
192511172	SAMRAKSHINI. G DEPARTMENT : B.E CSE	A GOVERNMENT EXAM BOARD CONNECTS 1000, CENTRES USING IP HIERARCHY AND SECURE ROUTING

PARAMETERS :

- * VLSM PLANNING
- * ROUTE AUTHENTICATION
- * IP AGGREGATION

QUESTIONS :

1. IF 800 CENTERS NEED 64 IPS AND 200 CENTRE NEED 32 IPS, WHAT IS THE TOTAL ADDRESS SPACE REQUIRED?

GIVEN DATA :

- 800 CENTERS NEED 64 IPS EACH
- 200 CENTRES NEED 32 IPS EACH

STEP 1 : FIND THE SIZE OF SUBNET NEEDED,

- 64 IPS \rightarrow which needs 126 subnets

which is $2^6 = 64$ addresses

- 32 IPS \rightarrow needs 127 subnets, which is $2^5 = 32$ addresses.

STEP 2 : TOTAL IP ADDRESSES USED :

- $800 \times 64 = 51,200$ IPS
- $200 \times 32 = 6,400$ IPS

\therefore Total IP addresses used : $51,200 + 6,400 = 57,600$ IPS

So, the total address space required is 57,600 IPS

STEP 3 : SMALLEST BLOCK THAT CAN ACCOMMODATE THIS ?

- The smallest power of 2 $\geq 57,600$
 $\rightarrow 2^{16} = 65,536$, \therefore 11b block (i.e 65,536) IPS is the smallest that fits all.

2) HOW DOES OSPF MD5 AUTHENTICATION PREVENTS ROUTE INJECTION ?

Route injection is when an unauthorized or malicious router sends fake OSPF routing updates to

- \rightarrow Redirect traffic
- \rightarrow cause routing loops
- \rightarrow Disturb the network

MECHANISM :

\rightarrow **CONFIGURATION :**

- All routers are configured with the same secret Key which are located in the same network.

→ HASH GENERATION:

• Before sending an OSPF packet, the router

- * Adds a sequence number
- * Hashes the packet + Key using MD5
- * Appends the MD5 digest to the packet

→ PACKET VALIDATION:

The receiving router:

- i) Extract the MD5 digest
- ii) Recalculates the hash using

the same Key

- iii) If it matches → accept packet

If not → reject the packet.

POSSIBLE THREATS	HOW MD5 STOPS IT
Fake router tries to send OSPF update	It doesn't have the secret key → hash fails → packet dropped.
Spoofted router pretending to be an original	Without the control key, its update is rejected.
Replay attack (reusing old OSPF packets)	sequence number ensures old packets are ignored.

∴ Only the routers with the correct secret key can send valid routing updates.

3) HOW MANY /26, /27 BLOCKS ARE NEEDED?

- /26 = 64 IPS

- /27 = 32 IPS

In the question, it is given

- 800 centers = $\frac{800 \times /26}{2}$ subnets are

required.

- For 200 centers : $200 \times /27$ subnets are required.

∴

800 /26 blocks = 51,200 IPS
200 /27 blocks = 6400 IPS