***1.How many subnets and hosts per subnet can you get from the network 192.168.119.0/28?***

*CIDR NOTATION = /28*

*As per CIDR Notation the subnet mask belongs to CLASS C i.e 255.255.255.0*

*Given Subnet Mask = 255.255.255.240 ( 1 1 1 1 0 0 0 0 ):-Binary conversion of 240*

*Number of host per subnet = 14 ( [2^n] -2) where n = 4 {NUMBER OF 0’s in binary bits of last octet}*

*Number of Subnets = 16 (2^m) where m = 4 {NUMBER OF 1’s in binary bits of last octet}*

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| ***2.You need to subnet a network that has 5 subnets, each with at least 16 hosts. Which classful subnet mask would you use?***  ***A. 255.255.255.192***  ***B. 255.255.255.224***  ***C. 255.255.255.240***  ***D. 255.255.255.248***  *On conversion of last octet of all the give subnets we find that*  *255.255.255.192 (1 1 0 0 0 0 0 0 ) 4 Subnets Each with 62 Hosts*  *255.255.255.224 (1 1 1 0 0 0 0 0 ) 8 Subnets Each with 30 Hosts*  *255.255.255.240 (1 1 1 1 0 0 0 0 ) 16 Subnets Each with 14 Hosts*  *255.255.255.248 (1 1 1 1 1 0 0 0) 32 Subnets Each with 6 Hosts*  *So the nearest best solution we can find is 255.255.255.224 as it contains only 8 Subnets as well as 30 hosts per subnet .So the solution is B*  ***3.What is the broadcast address of the network 172.24.160.0 255.255.240.0?***  *Given IP :- 172.24.160.0 (1 0 1 0 0 0 0 0 . 0 0 0 0 0 0 0 0)*  *Given Subnet Mask :- 255.255.240.0 AND*  *Inverted Subnet Mask :- 0.0.15.25 ( 0 0 0 0 1 1 1 1 . 1 1 1 1 1 1 1 1 )*  *Broadcast IP :- 172.24.175.255 (1 0 1 0 1 1 1 1 . 1 1 1 1 1 1 1 1 )*  *CIDR Notation =/20*  *Note the Highlighted part is only for the last two octet of the subsequent IP or subnet* |
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| ***4.Describe steps involved during communication between between two network.***    *1. PC1 pings PC2*  *2. The routing table on PC1 identifies that PC2 (192.168.2.2) is on a different network*  *3. The packet would be sent to the gateway IP address configured on the PC as the destination is on a different network and the PC does not have any other option as a specific route to the network 192.168.2.0 is unavailable on the routing table of the PC.*  *4. Since the specific route is unavailable, the default route on the PC, which is populated by the operating system after the gateway IP address is configure would be used.*  *5. The packet has to be encapsulated in a frame and sent to the gateway*  *6. To generate the frame, the destination mac-address of the gateway is required.*  *7. PC1 sends ARP request to find out the mac-address of the interface of the router configured with the IP address 192.168.1.1. ( Note: If the ARP Cache on the PC contains the IP/Mac mapping for 192.168.1.1, this step would skipped and the frame encapsulating the IP packet would be sent directly to 192.168.1.1)*  *8. The router responds with an ARP reply.*  *9. PC1 uses the mac-address in the ARP reply, constructs the frame and sends the packet to the router.*  *10. The router is configured with two IP addresses, 192.168.1.1/24 and 192.168.2.1/24. When configured, routing tables are populated and 192.168.1.0/24 and 192.168.2.0/24 ( the corresponding network addresses) are listed as directly connected networks.*  *11. When the packet reaches the router, the destination IP address is looked into (192.168.2.1). The router checks if it is aware of the destination network for the destination IP packet.*  *12. Since the network is a directly connected network, the router knows which interface to use.*  *13. The router sends out an ARP request to find out the mac-address of PC2 (( Note: If the ARP Cache on the router contains the IP/Mac mapping for PC2, this step would be skipped and Step 15 would be executed)*  *14. PC2 would send an ARP Reply with it's mac-address.*  *15. The router would encapsulate the packet with the new frame, where the source mac-address is the mac-address of the interface corresponding to 192.168.2.1 and the destination mac-address would be PC2'S*  ***5.When to use Elastic IP over Public IP***  *Let's assume that you launched an EC2 instance and installed httpd server. After that, you hosted one webpage (.html). Now you want to test that whether a hosted webpage is working fine and accessible from the internet. For that, you can test with the public IP or Elastic IP address attached with the instance by simply browsing in the browser.*  *But the problem with public address of the instance is that it will change every time when you stop and restart the instance. If you use elastic IP address instead of public IP, it will not change even when you stop and restart the instance. So, if you want to attach a persistent and re-attachable IP address to your instance, then you can use the Elastic IP address.* |

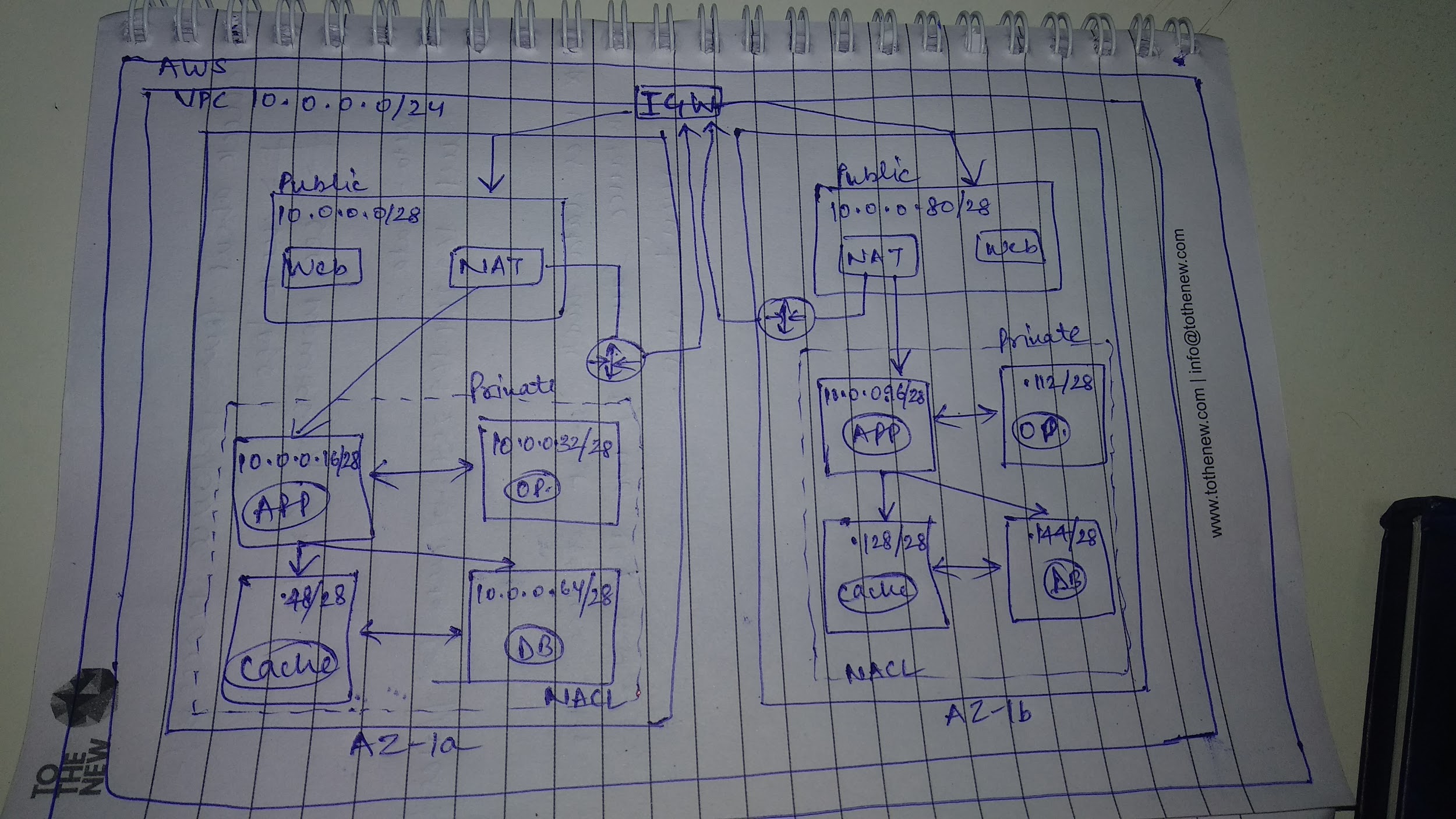
***6.Valid IP Ranges for LAN, Implication of using Public IP ranges for Private Network.***

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| --- | --- | --- |
| ***Address range*** | ***Subnet mask*** | ***Addresses per LAN*** |
| *10.0.0.0 - 10.255.255.255.255* | *255.0.0.0* | *16,777,216* |
| *172.16.0.0 - 172.31.255.255* | *255.255.0.0* | *65,536* |
| *192.168.0.0 - 192.168.255.255* | *25.255.255.0* | *256* |

*Implication for Public IP ranges for Private Network is very easily possible as it is up the the router network of that network to use whichever IP range they want to. But in case when the Private Network needs to connect to some hosts/servers over the Internet then there might be a problem for the IP replication over the internet. In such case NAT and firewall enabled routers can only help to communicate to the Internet.*

***7. Draw AWS Network Arch Diagram based on following criteria :***

* ***Tech Stack will have “Web, App, Cache, DB, Operation”.***
* ***Web stack Required Public Interaction***
* ***250 hosts, 10 nodes per stack***
* ***Should be Redundant***
* ***Enable Internet Access for Private Subnet***
* ***Security Service at each Layer.***

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