A blue and black logo

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**East West University**

**Course Code:** CSE405

**Course Name:** Computer Network

**Section:** 01

**Project Name:** Design a full-fledged network for an organization with multiple subnets.

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# **1. Introduction**

The large higher-education institution Apex University operates across eight campuses. To provide academic, administration and research support, both the wired and wireless networks must be connected to each campus. Built for high availability, the network offers centralized services (DNS, DHCP, WebServer), scalability, and future capacity for growth at one time while guaranteeing security and manageability.

**2. Purpose of the Network**

The design of this network is aimed at unifying all eight of Apex University's campuses. Realize automatic IP assignment through a single DHCP server, centered at one of the locations. A DNS server (apex.edu.bd) resolves names and provides web hosting for sites facing the public Internet. Based on supporting both wired and wireless modes, the network design satisfies the access requirements of students, teaching staff and administrators

**3.Requirement Specification**

**Functional Requirements**

1. Each campus must connect one's own private campus network with the backbone router that connects all seven.
2. Centralized DHCP servers allocate Ips to all hosts.
3. The DNS server needs to resolve apex.edu.bd into an IP address where there is only one WebServer listening.
4. OSPF routing is used to ensure that campus routers can exchange routes dynamically.
5. Wired and wireless clients co-exist in campus LANs.

A diagram of a network

AI-generated content may be incorrect.**4.Physical Network Diagram:**

**Description:**

**Figure-** 1

**R1-R8:** Routers are assigned one per campus.

**Server Room:** Connected to Campus 5 which has DHCP, DNS, and the Web server.

**LANs:** Each campus has its own subnet with wired and wireless hosts.

**5.Lines of codes (CLI)**

**Router 1**

interface fa0/0

ip address 128.10.20.254 255.255.0.0

no shut

do wr

exit

interface se2/0

ip address 128.20.0.1 255.255.0.0

clock rate 64000

no shut

do wr

exit

interface se3/0

ip address 128.30.0.1 255.255.0.0

clock rate 64000

no shut

do wr

exit

interface fa0/0

ip helper-address 128.254.20.1

no shut

exit

**Algorithm used:** Dynamic Routing Algorithm(OSPF)

router ospf 1

network 128.10.0.0 0.0.255.255 area 1

network 128.20.0.0 0.0.255.255 area 1

network 128.30.0.0 0.0.255.255 area 1

exit

**Router 2:**

interface se3/0

ip address 128.30.0.2 255.255.0.0

clock rate 64000

no shut

do wr

exit

interface se2/0

ip address 128.31.0.1 255.255.0.0

clock rate 64000

no shut

do wr

exit

interface fa0/0

ip address 128.40.20.254 255.255.0.0

no shut

do wr

exit

interface fa0/0

ip helper-address 128.254.20.1

no shut

exit

router ospf 2

network 128.31.0.0 0.0.255.255 area 1

network 128.40.0.0 0.0.255.255 area 1

network 128.30.0.0 0.0.255.255 area 1

exit

**Router 3:**

interface fa0/0

ip address 128.50.20.254 255.255.0.0

no shut

do wr

exit

interface se2/0

ip address 128.32.0.1 255.255.0.0

clock rate 64000

no shut

do wr

exit

interface se3/0

ip address 128.33.0.1 255.255.0.0

clock rate 64000

no shut

do wr

exit

interface fa0/0

ip helper-address 128.254.20.1

no shut

exit

router ospf 3

network 128.32.0.0 0.0.255.255 area 1

network 128.33.0.0 0.0.255.255 area 1

network 128.50.0.0 0.0.255.255 area 1

exit

**Router 4 :**

interface fa0/0

ip address 128.60.20.254 255.255.0.0

no shut

do wr

exit

interface se2/0

ip address 128.33.0.2 255.255.0.0

clock rate 64000

no shut

do wr

exit

interface se3/0

ip address 128.34.0.1 255.255.0.0

clock rate 64000

no shut

do wr

exit

interface fa0/0

ip helper-address 128.254.20.1

no shut

exit

router ospf 4

network 128.34.0.0 0.0.255.255 area 1

network 128.33.0.0 0.0.255.255 area 1

network 128.60.0.0 0.0.255.255 area 1

exit

**Router 5:**

interface fa0/0

ip address 128.254.20.254 255.255.0.0

no shut

do wr

exit

interface se6/0

ip address 128.38.0.1 255.255.0.0

clock rate 64000

no shut

do wr

exit

interface se2/0

ip address 128.32.0.2 255.255.0.0

clock rate 64000

no shut

do wr

exit

interface se7/0

ip address 128.34.0.2 255.255.0.0

clock rate 64000

no shut

do wr

exit

interface fa0/0

ip helper-address 128.254.20.1

no shut

exit

router ospf 5

network 128.254.0.0 0.0.255.255 area 1

network 128.34.0.0 0.0.255.255 area 1

network 128.38.0.0 0.0.255.255 area 1

network 128.32.0.0 0.0.255.255 area 1

exit

**Router 6:**

interface fa0/0

ip address 128.70.20.254 255.255.0.0

no shut

do wr

exit

interface se2/0

ip address 128.35.0.1 255.255.0.0

clock rate 64000

no shut

do wr

exit

interface se3/0

ip address 128.36.0.1 255.255.0.0

clock rate 64000

no shut

do wr

exit

interface fa0/0

ip helper-address 128.254.20.1

no shut

exit

router ospf 6

network 128.70.0.0 0.0.255.255 area 1

network 128.35.0.0 0.0.255.255 area 1

network 128.36.0.0 0.0.255.255 area 1

exit

**Router 7:**

interface fa0/0

ip address 128.80.20.254 255.255.0.0

no shut

do wr

exit

interface se2/0

ip address 128.35.0.2 255.255.0.0

clock rate 64000

no shut

do wr

exit

interface se3/0

ip address 128.37.0.1 255.255.0.0

clock rate 64000

no shut

do wr

exit

interface fa0/0

ip helper-address 128.254.20.1

no shut

exit

router ospf 7

network 128.80.0.0 0.0.255.255 area 1

network 128.35.0.0 0.0.255.255 area 1

network 128.37.0.0 0.0.255.255 area 1

exit

**Router 8:**

interface se2/0

ip address 128.37.0.2 255.255.0.0

clock rate 64000

no shut

do wr

exit

interface se7/0

ip address 128.20.0.3 255.255.0.0

clock rate 64000

no shut

do wr

exit

interface se3/0

ip address 128.36.0.2 255.255.0.0

clock rate 64000

no shut

do wr

exit

interface se8/0

ip address 128.31.0.3 255.255.0.0

clock rate 64000

no shut

do wr

exit

interface se6/0

ip address 128.38.0.2 255.255.0.0

clock rate 64000

no shut

do wr

exit

router ospf 8

network 128.37.0.0 0.0.255.255 area 1

network 128.20.0.0 0.0.255.255 area 1

network 128.38.0.0 0.0.255.255 area 1

network 128.31.0.0 0.0.255.255 area 1

network 128.36.0.0 0.0.255.255 area 1

exit

**6. Designs:**

**A close up of numbers

AI-generated content may be incorrect.Planning of IP addresses:**

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**DHCP SERVER:**

**A screenshot of a computer

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**Figure -**2

**Assigned Ip through DHCP server:**

**A computer screen shot of a computer

AI-generated content may be incorrect.**

**Figure-**3

**DNS SERVER:**

**A computer screen shot of a computer

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**A screenshot of a computer

AI-generated content may be incorrect.**

**Figure-**4

**A screenshot of a computer

AI-generated content may be incorrect.Web Server:**

**A screenshot of a computer

AI-generated content may be incorrect.**

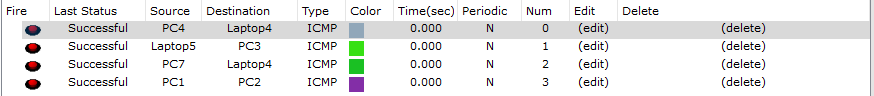
**Figure-**5

**Accessing University URL from different networks:**

A screenshot of a computer

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**Figure-**6

**Testing ping with simple PDU:**

**Number of hosts and Networks:**

* **Total number of networks:** 8
* **Total number of hosts:** 27(includes wireless host)

**7.Design Issue:**

There are several issues with the network design that could harm performance and reliability. Lack of redundancy for critical devices such as routers or switches. In case router8 fails, the whole inter-connected network will be disrupted. Even though Dynamic Routing was used here, but through static routing, the routing setup will become more complicated as the network expands. Segmentation in the network is unavailable, with no firewalls to divide networks into segments and prevent devices from talking freely all over subnets. The other problem with flat architecture is scaling and as the network becomes bigger this can be seriously troublesome. But wireless performance may suffer from interference with overlapping channels, and without proper monitoring troubleshooting could prove difficult as the network extends.

**8.Limitations:**

There is a high degree of complexity involved in this network, making its future management and maintenance more difficult. Then there is the need to integrate another campus network onto a system of this kind. As a result, this is no simple matter. One line at a time, each member of the complex structure must be regularly aligned, and sometimes even the previous system adjusted to fit in line. This task becomes much more difficult when scaling far distances is involved. Therefore the number of hosts that the network can support is very limited. The advantage of adding more devices to increase processing capacity; On occasion however it may become a bottleneck, with each device now working overtime and incapable of carrying out any more than its alloted task for the overall interference with availability, congestion helplessly follows suit-bound to slow things down.

**9. Conclusion:**

We have successfully established a network that includes routers, switches and wireless. And as like connected to a local area network, all devices on our network can now inter-communicate with each other as easily without interference from the outside. A web server now serves up the Apex University web site and a DHCP server assigns hosts (computers and similar) their IP addresses. The node which offers any and all necessities in formation its architectures across networks is integrated together so that everything will run smoothly.