



Institute of Engineering & Technology, Indore

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| CLASS WORK |
| SESSIONAL WORK |

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| ASSIGNMENT | 4 |
| No _____ | |
| EXPERIMENT | |

SUBMITTED ON 10/04/2020 MARKS OR GRADE OBTAINED _____

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CLASS BE 3rd yrs (6th Sem) DEPARTMENT Comp. Eng.

SUBJECT Wireless Networks CODE NO _____

Signature of Student

Signature of Professor

| <u>ASSIGNMENT - 4</u> | |
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| Q.1.) Explain different entities and terminologies of mobile network layer along with their functionalities. | |
| Ans - | <ul style="list-style-type: none">• Mobile Node (MN) - It is the hand held communication device that the user carries e.g. cell phone.• Home Network - It is a network to which the mobile node originally belongs to as per its assigned IP address (home address)• Home Agent (HA) - It is a router in home network to which the mobile node was originally connected. |
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- **Home Address**:- It is the permanent IP address assigned to the mobile node (within its home network).
- **Foreign Network**:- It is the current network to which the mobile node is visiting (away from its home network).
- **Foreign Agent(FA)**:- It is a router in foreign network to which mobile node is currently connected. The packets from the home agent are sent to the foreign agent which deliver it to the mobile node.
- **Correspondent Node (CN)**:- It is the device on the internet communicating to mobile node.
- **Care of Address (COA)**:- It is the temporary address used by a mobile node while it is moving away from its home network.



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Q.2.) what are the consequences and problems of using IP with standard routing protocols for mobile communication? What are the quick solution and why we cannot use them?

Ans. Mobile IP problem and quick solution

- Protocols were not designed the thing in mind called MOBILITY.
- Improvement in classical IP concept, since in computer networks a IP is allocated to system for comm.
- A host needs a topological correct address (129.13.42.1)
- Solution for Mobility.
 - # Assign a new IP address when system moves from one location to another.
 - Problem with above solution is identification of new address.
 - But DNS can do this, but it needs time.
 - # One more problem with above solution is TCP relies on IP. If IP gets change TCP connection does not survive.
 - # TCP connection is identified by a triplet source IP, source port, destination IP, destination port).

• Another solution is creation of specific route to the mobile node by updating the routers.

But it is practically not possible.

Routers are built for fast forwarding but not for fast update of routing table.

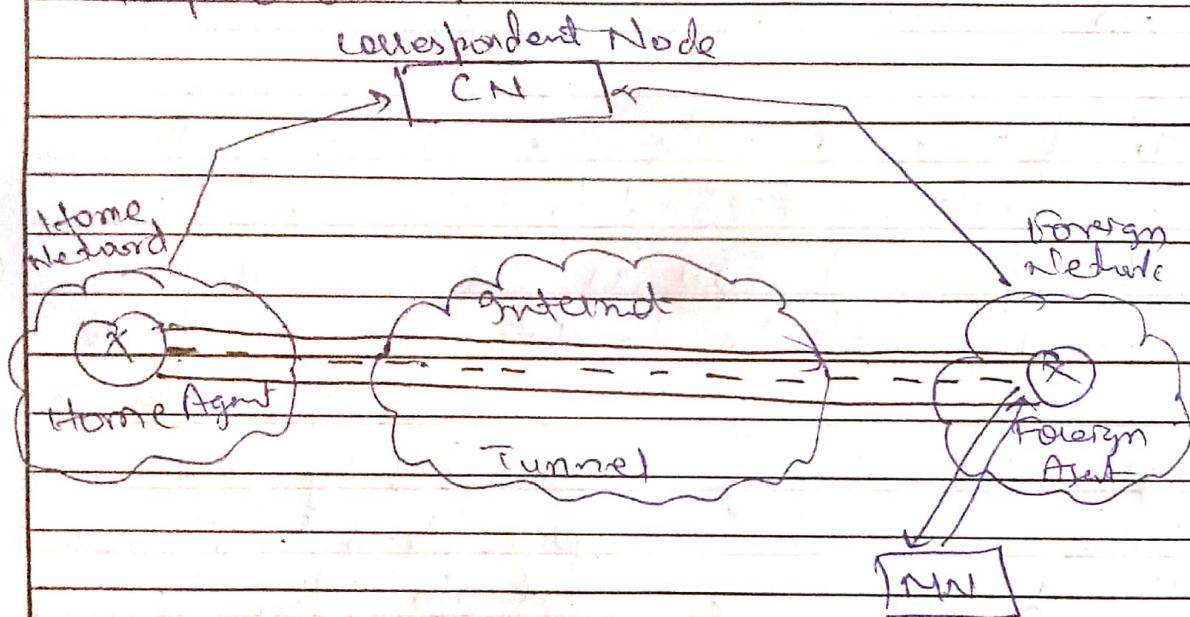
Q.3) How data is transfer from a mobile node to a fixed node explain? why and where encapsulation is needed.

Ans Correspondent node sends the data to the mobile node. Data packets contains correspondent node's address (source) and home address (destination). Packets reaches to the home agent. But now mobile node is not in the home network, it has moved in to the foreign network. Foreign agent sends the care of address to the home agent to which all the packets should be sent. Now a tunnel will be established b/w the home agent and the foreign agent by the process of Tunneling.

Tunneling establishes a virtual pipe for the packets available b/w a tunnel entry and



an entry point. It is the process of sending a packet via a tunnel and it is achieved by a mechanism called encapsulation.

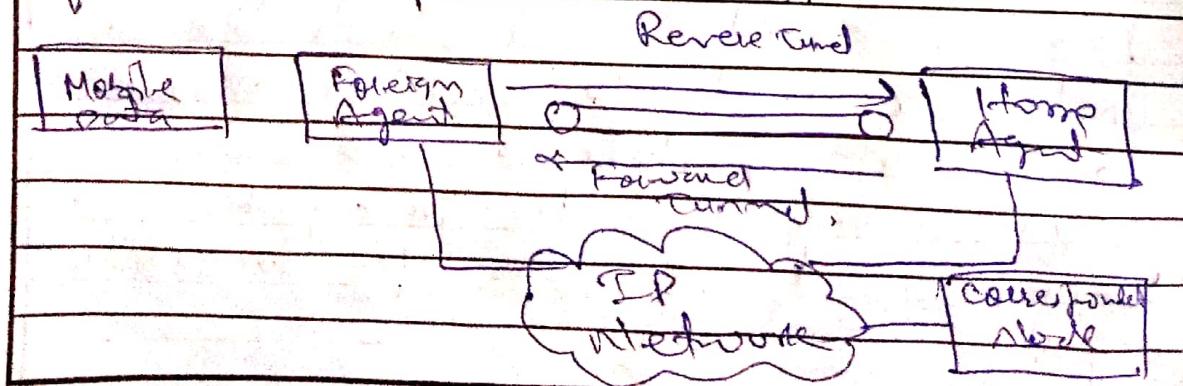


Now, Home agent encapsulates the data packet into new packets in which the source address is the home address and destination is care of address and sends it through the tunnel to the foreign agent. Foreign agent on other side of the tunnel receives the data packet, deencapsulates them and sends them to mobile node. Mobile node in response to the data packets received sends a reply in response to foreign agent. Foreign agents send the reply to correspondent agent.

(Q.9) Explain packet flow if two mobile nodes communicate with each other and both are in foreign networks. What additional routes do packets take if reverse tunneling is required.

Ans If HN_a and HN_b are both in foreign network attached to FA_a and FA_b the packet flow is as follows. HN_a sends Packet_a to HN_b via the internet to HA_b (actually, HN_a sends to HN_b; add route packets as only intercepted by HA_b).

HA_b encapsulates the packet to FA_b which then forwards the packet to HN_b. If reverse tunneling is required, the packet flow is as follows. HN_a send its packet via FA_a through the reverse tunnel via HA_a and the internet to HA_b, HA_b then forwards the packet through the tunnel to FA_b which in turn forwards the packet to HN_b.





Q.5) What is DHCP? What is its purpose?
Name the entities of DHCP. How can
DHCP be used for mobility and
support of mobile IP?

A) DHCP(Dynamic Host Configuration Protocol) is a network management protocol used to dynamically assign an IP address to any device, or node on a network so they can communicate using IP. It will assign new IP address in each location when device are moved from place to place, which means network administrators don't have manually configure each device with a valid IP address or reconfigure the device with a new IP address if it moves to a new location on the network.

Components

DHCP is made up of numerous components such as DHCP server, client and relay. The DHCP server typically either a server or router is a networked device that runs on the DHCP service. The DHCP server holds IP addresses as well as related information pertaining to configuration. The DHCP client is a device

such as a computer or phone that can connect to a network and communicate with a DHCP server. The DHCP relay will manage requests between DHCP clients and servers. Typically, relays are used when an organization has to handle large and complex networks. Other components include the IP address pool, subnet mask and DHCP communication protocol.

DHCP is a good candidate for supporting the acquisition of WIA for mobile nodes. The same holds for all other parameters needed such as address of the default router, DNS servers etc. A DHCP server should be located in the subnet of the access point of the mobile node, or at least a DHCP relay should provide forwarding of the message.



Q.6.) Compare different type transmission errors that can occur in wireless and wired networks.

Ans

Packet loss due to congestion -
Congestion may appear from time to time even in carefully designed networks. If the packet buffers of a router are filled and the router cannot forward the packets fast enough because the sum of input rates of packets destined for one output link is higher than the capacity of the output link. The only thing a router can do in this situation is to drop packets. This kind of packet loss can occur in both wireless and wired networks.

Packet loss due to random loss -
The random loss is due to bit corruption and link errors. In wired network the transmission error rate ($10^{-10}-10^{-12}$) is generally very low so that it can be neglected however it is not true for the wireless networks ($10^{-2}-10^{-4}$).

Packet loss due to burst loss:-

The burst loss may be initiated by signal fading, Prolonged uncontrolled channel interference can lead to correlated packet losses. but it generally occurs over a very short duration, leading a loss of several consecutive segments at a time. In a infrastructure network, when a mobile host is moved from the coverage of a base station to another, all subsequent communication are routed via the new base station and the hand off process is completed. However the packets may be lost as they are routed to the old station during the process of the handoff. Therefore a handoff event can initiate a burst loss event. In adhoc networks same situation can happen due to the mobility of the mobile host. the network connectivity and the network topology can change. The transmission path for a buffer from may be affected. Some time is necessary to complete the routing process for the traffic flow. Then some packets belong to the same buffer flow may be lost during the process. As a result a burst loss event occurs.



(i) Can we solve the problem of using TCP by replacing it with UDP. Where could this be useful and why is it quite often dangerous for network stability.

Ans) Using UDP, a better throughput can be achieved but it only works for a few uses doing so if a higher no. of users would transmit data over UDP, the missing congestion control would lead to high packet loss. Furthermore, more UDP does not provide reliable data transfer. Thus for only small number of users using UDP brings advantage. If the application layer takes over control functionality for reliable data transfer.

Mobility support in IP (such as mobile IP) is already enough for UDP to work.

(a) Explain

(a) CODA file systems

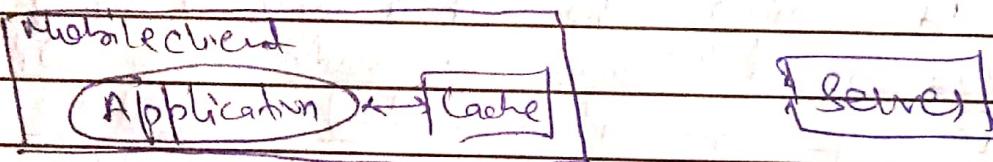
CODA is an advanced networked file system for a large scale distributed computing environment.

It is composed of UNIX work-stations or operate on Linux environment. It provides resilience to server and network failures through the use of dual mechanism.

→ Server Replication.

→ It stores copies of file at multiple servers.

→ Caching on clients.



Features of CODA:

- (1) Disconnected operations for mobile computing.
- (2) It is freely available under GPL.
- (3) High performance through client-side persistent caching.
- (4) Server replication.
- (5) Security model authentication, encryption and access control.
- (6) Continued operation during partial network failure in sever network.
- (7) Network bandwidth adaption.
- (8) Good scalability.



(b) WAP Architecture.

- It provides scalable and extensible environment for application development of mobile.
- It is achieved using layered design of protocol stack. The layers resemble the layers of OSI model. Each layer is accessible by layers above as well as by other services and application through a set of well defined interface.
- External application may access session layer directly.

WAP Architecture

Application Layer

This layer contains wireless applⁿ environment (WAE). It contain mobile device reconfiguration and content developⁿ programming language like WML.

Session Layer

It contain wireless session protocol (WSP). It provides fast connection suspension and reconnection.

Transaction Layer -

This layer contains wireless transaction protocol (WTP). It runs on top of UDP and is part of TCP/IP and offers transaction support.

Security Layer

This layer contains wireless transaction layer security (WTLS). It offers data integrity, privacy and authentication.

Transport Layer

This layer contains wireless Datagram protocol (WDP). It presents consistent data format to higher layers of WAP protocol stack.

