

## \* Motivation for Mobile IP.

MN      MN  
connected      MN  
MN      connected

MN+COA (Care of Address)

Gateways are responsible for managing compatibility

"Transparency, compatibility, security"

Components:

MN - mobile node - responsible for carrying IP addr.  
acts either as source or destination

CN - correspondent node

FA - Foreign Agent - responsible for giving COA

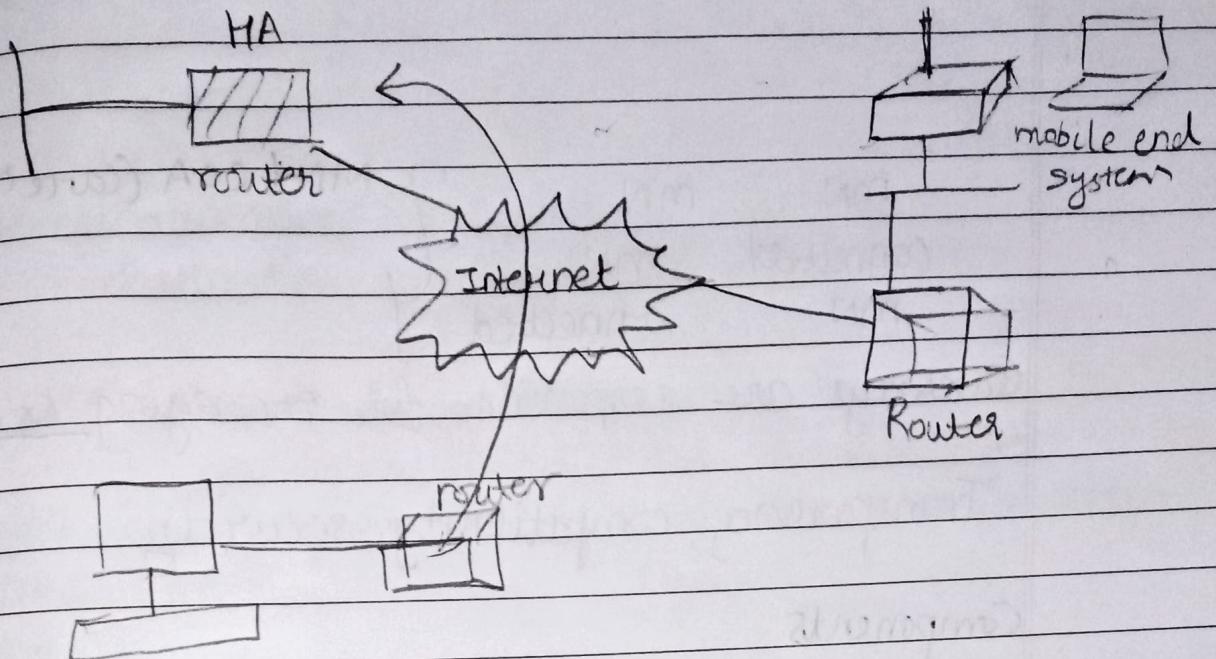
Temporary address given to node when it is in foreign nw.

FA verifies the details from the Home agent and check if it is valid and then only then the COA will be considered valid.

This is known as the registration and authentication process.

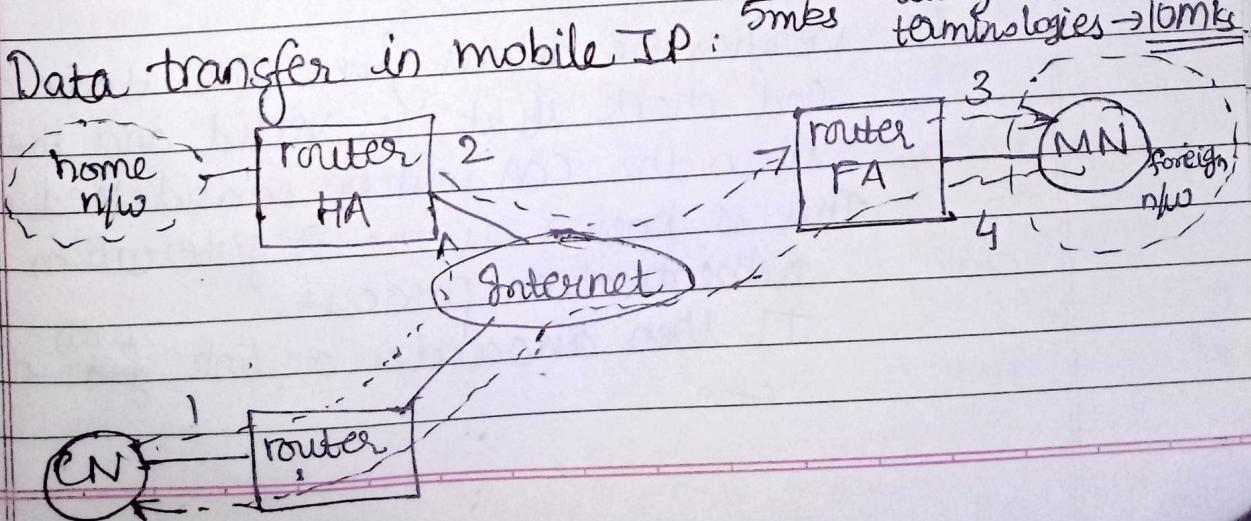
It then associates a link <sup>with</sup> for it

Example n/w :



If the mobile node moves from foreign n/w 1 to foreign n/w 2, it updates that the node has moved and new Foreign n/w 2 will perform the registration process again so new current COA will be of a FA 2

\* Data transfer in mobile IP : 5ms along with terminologies  $\rightarrow$  10ms



## ⇒ Terminologies in Mobile IP:

### 1) MN - Mobile Node:

- It is a node that can change point of connection do the n/w w/o changing its IP address

### 2) HA Home Agent

- It is a system in the home n/w of mobile node that typically acts as router which registers the location of mobile node and tunnels IP datagrams to COA.

### 3) FA - Foreign Agent

- It is a system in the current foreign n/w of the MN typically a router which forwards the packets to mobile node and also acts as a default router for the mobile node.

### 4) COA

- Address of the current tunnel end point for the mobile node at MN. It gives the actual location of mobile node from a POV of IP

### 5) CN (Correspondent Node)

- Communication partner.

## ⇒ Steps:

- 1) CN sends packet do the IP address of MN
- 2) HA intercepts by identifying MN is not present in the Home n/w and searches for COA for

relative IP address of MN.

Step 2) HA tunnels packet do COA with details of FA by encapsulation.

Step 3) FA locates MN in its foreign n/w and forward the packet to MN or

Step 4) On identification of source and receiving the packets forwarded by FA, MN acknowledges the data packets received to CN.

#### \* Motivation of IP:

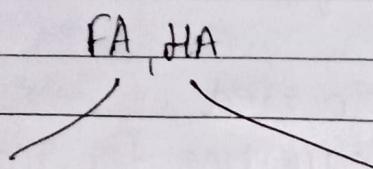
- 1) Routing which manages the change of IP addresses.
- 2) Specific routes for every end system
- 3) Changing IP addresses, everytime a mobile node moves, it becomes difficult to adjust the Host IP address depending on their current location.

#### \* Requirements

- 1) Transparency - giving the current and correct info of the movement of node
- 2) Compatibility - All the subnetworks have to adjust to the changing n/w
- 3) Security - while the movement of mobile nodes

from one n/w to other n/w happens, registration along with authentication has to be performed

4) Scalability - The message exchange is required in order to attain CoA and update CoA & all types of n/w have to support this.



Advertisement

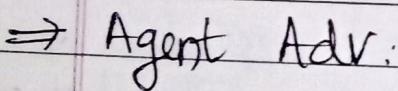
3 adv/sec

- indicates that fAs are available.

- MN gets to know whether a FA is fully loaded or not due to adv.

Solicitation

MN itself assigns a CoA



1) type - 16 - indicates it supports mobility, ICMP

2) length - how many CoAs

3) sequence no - which seq no of adv, the mobile node has entered into the n/w

4) Registration lifetime - time limit for registration

5) B bit - the FA is loaded.

Q) How does a mobile node identify agent when it is not in Home n/w.

## → Solicitation :

- A mobile node when allocates a COA, by accommodating in FA when no foreign agents are advertising.

## \* Registration → request

type - 0 → collocated

1 → requesting for registration.

3 → previous bindings help to track the mobile nodes

B → m → type of encapsulation. Here, minimal

r, x → for n/w operations

## → Reply :

type 3 indicates - reply.

code = 1 if reg. successful but with limitation.

- in exam write 1 or 0.

## Registration request packet:

0	7	8	15	16	23	24	31
type=1	segment	lifetime					
		home address					
		home agent					
		COA					
		identification					
		extensions					

S - Simultaneous binding .

B - Broadcast

D - Decapsulation

m - minimal et encapsulation / G-GRE encapsulation

r/z → reserved → details in identification .

## Registration reply:

0	7	8	15	16			31
type=3	code			}	lifetime		
		home address					
		home agent					
		identification					
		extensions..					

\* Encapsulation:

IP-in-IP

ver	IHL	DS(TOS)	length
IP identification			flags fragment offset
TTL	IPin-IP		IP checksum
		IP address of HA	
		care of address COA	
ver	IHL	DS(TOS)	length
IP identification			flags fragment offset
TTL	Layer 4 protocol		IP checksum
		IP address of CN	
		IP address of MN	
		TCP/UDP / payload.	

2) minimal

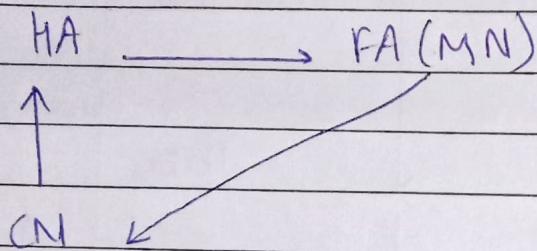
ver	IHL	DS(Tos)	length
IP identification			flags fragment offset
TTL	min encap		IP checksum
		IP address of HA	
		IP add care of add of COA	
layer 4 protocol	S reserved		IP checksum
		IP address of MN	
		original sender IPaddr (S=1)	
		TCP/UDP / payload	

3) GRC

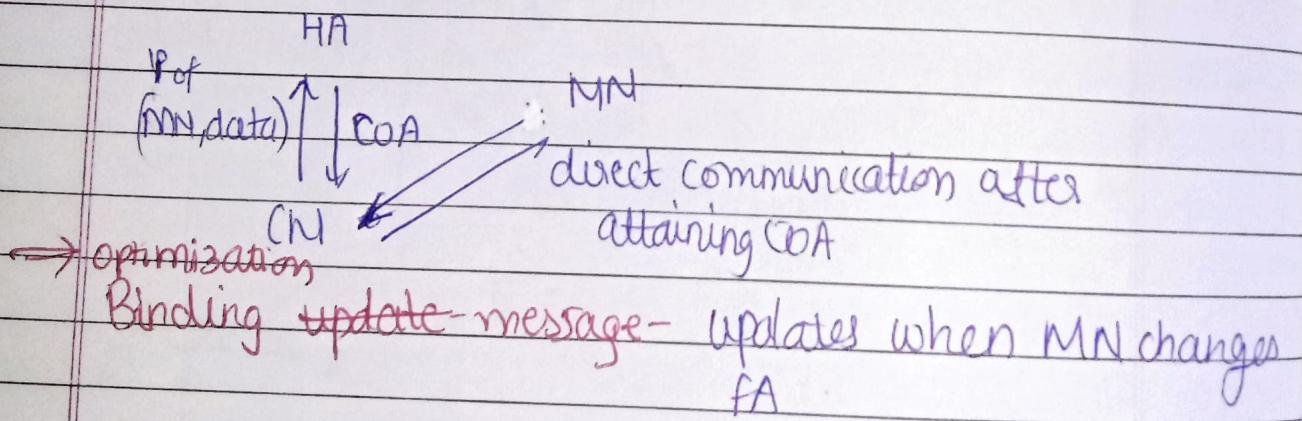
ver 1HL

## \* Triangular Routing problem: Optimization

Problem



Solution:



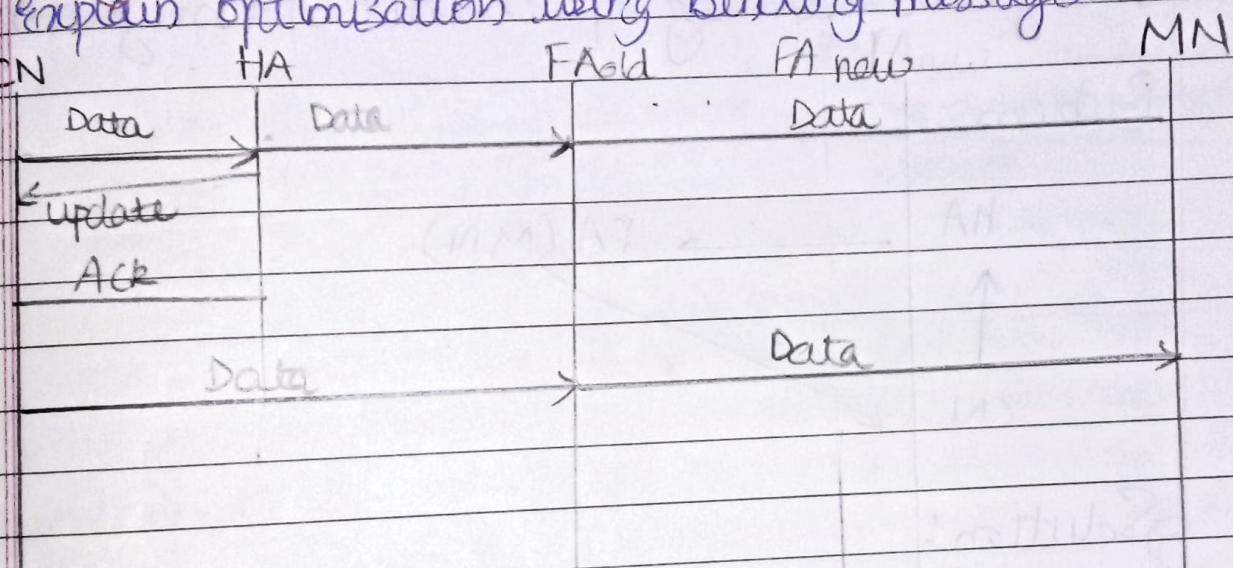
Binding warning message - "The node you are searching for is not present in this FA".

~~Optimization~~ Optimization is done using binding messages.

- 1) Binding Update
- 2) Binding Acknowledgement
- 3) Binding Request
- 4) Binding Warning

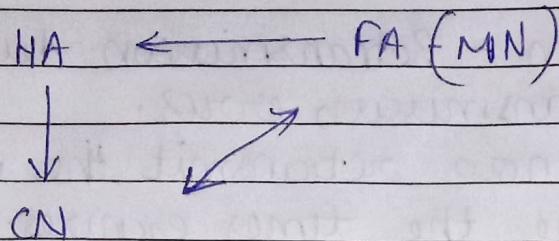
- diagram important ↓

Q Explain optimization using binding messages.



(refer diagram from ppt)

## \* Reverse tunneling :



## \* Problems in mobile IP:

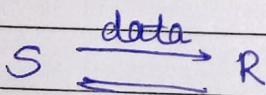
Q) What are the problems in mobile IP? 5marks

## \* TCP

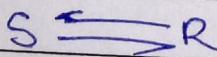
- end to end, connection oriented, reliable, secure

If fails when: congestion, connection destroyed  
 ↳ fast retransmission,  
 ↳ slow start algorithm, fast recovery

↳ It will get congestion window = 0  
 ↳ It will run at exponential rate after the threshold linear rate.



$$\text{congestion} = 0$$



congestion = 1      ↳ Increasing window size exponentially  
 = 2 ; = 4 ; = 8  
 congestion threshold will limit exponential process

After that certain threshold, it will

increase linearly.

- Retransmission - Retransmission due to congestion / transmission error.

Sender can now retransmit the missing packets before the timer expires.

- Receipt of ack contains no congestion & no need of slow start. It is called fast recovery from packet loss.

→ Improvements in classical / traditional TCP:

- ITCP

- STCP

- MTCP

i) ITCP (Indirect TCP)