SNS COLLEGE OF ENGINEERING

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Department of Computer Science Technology

Course Name – 19IT503 Internet of Things III Year / V

Semester

Unit 4 – IPv6 TECHNOLOGIES FOR THE IOT

Topic 3- Mobile IP (MIPv6)

Mobile IP

MIPv6 specifies a protocol that allows nodes to remain reachable while moving around in the IPv6 Internet

Mobile node (MN)

- A mobile node is a handheld equipment with roaming capabilities. It can be a cell phone, a personal digital assistant (PDA), a laptop, etc.

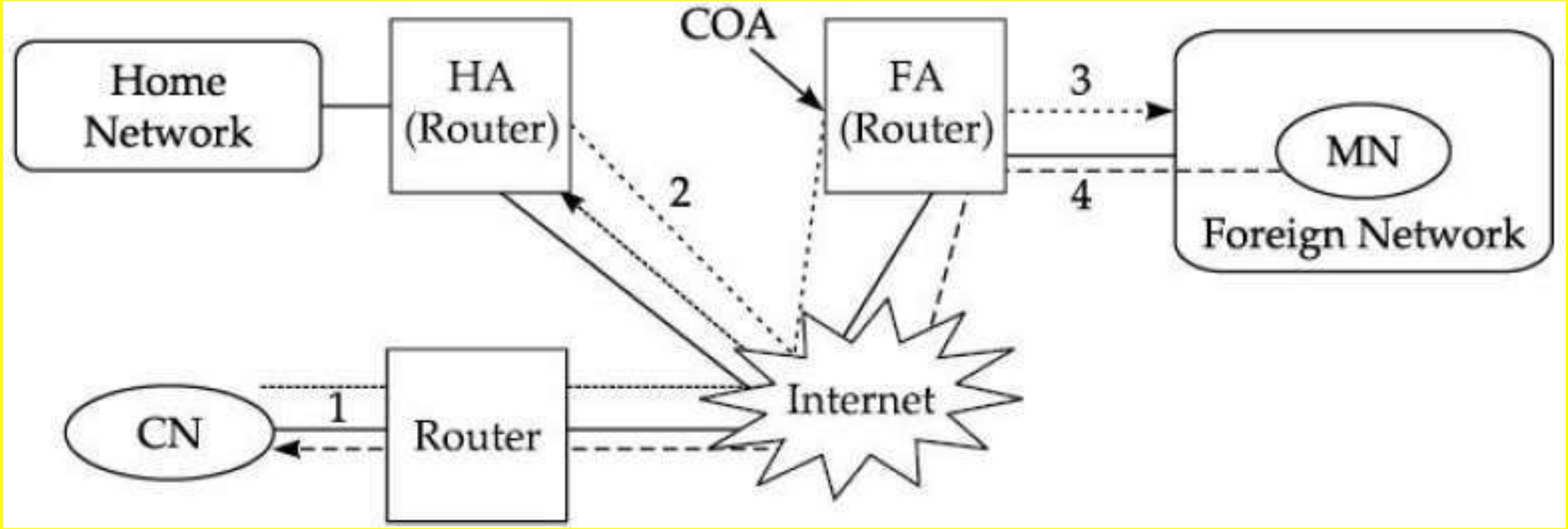
Home network

- The home network of a mobile device is the network within which the device receives its identifying IP address (home address). In other words, a home network is a subnet to which a mobile node belongs to as per its assigned IP address. Within the home network, there is no need of mobile IP.

Home agent (HA)

- The HA stores information about all mobile nodes whose permanent home address is in the network assigned to the HA. The HA maintains a location directory of the mobile handsets belonging permanently to the home network, and acts as a router for delivery of datagrams to the MH, when it is away from home.

Mobile IP


COA
Home Network
HA (Router)
FA (Router)
3
MN
2
4
Foreign Network
Internet
CN
1
Router

Mobile IP

Correspondent node (CN):

- A peer node with which an MN is communicating. The CN may be either mobile or stationary. A CN does not necessarily require MIPv6 support, but it does require IPv6 support.

Foreign agent (FA)

- The foreign agent is a router in a foreign network that functions as the point of attachment for a mobile node (MN) when it roams to the foreign network. The packets from the home agent are sent to the foreign node which delivers it to mobile node.

Foreign network

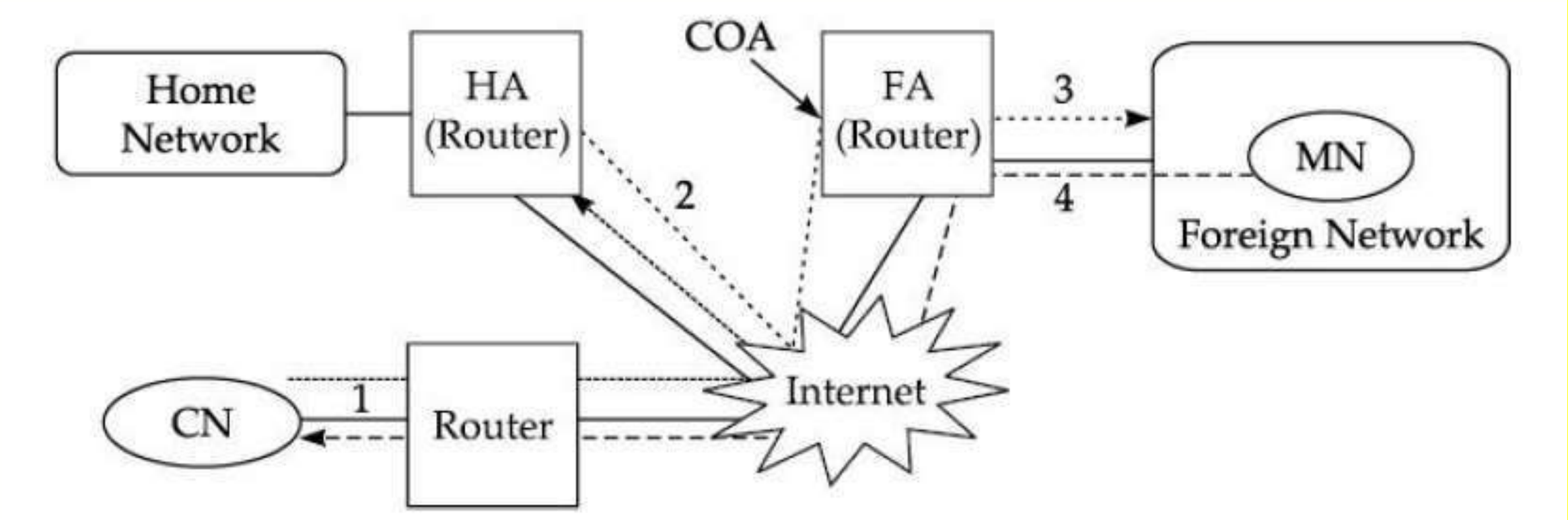
- The foreign network is the current subnet to which the mobile node is visiting. Itis different from home network. In other words, a foreign network is the network in which a mobile node is operating when away from its home network.

Care-of-address (COA)

- It is an address that identifies the mobile node’s current location. The packets sent to the MN are delivered to COA. COA is typically associated with the mobile node’s foreign agent (FA).

Mobile IP

Packet Delivery and use of Mobile IP



Mobile IP

Key Mechanism

Mobile IP is associated with the following three basic mechanisms

- Discovering the care-of-address
- Registering the care-of-address
- Tunneling to the care-of-address

Discovering the care-of-address

Each mobile node uses a discovery protocol to identify the respective home and foreign agents. The discovery of the care-of-address consists of the following important steps.

1.Mobile agents advertise their presence by periodically broadcasting the agent advertisement messages. Foreign agents send messages to advertise the available care-of addresses.

2.The mobile node receiving the agent advertisement message observes whether the message is from its own home agent and determines whether it is on the home network or on a foreign network.

3.If a mobile node does not wish to wait for the periodic advertisement, it can send out agent solicitation messages that will be responded to by a mobility agent

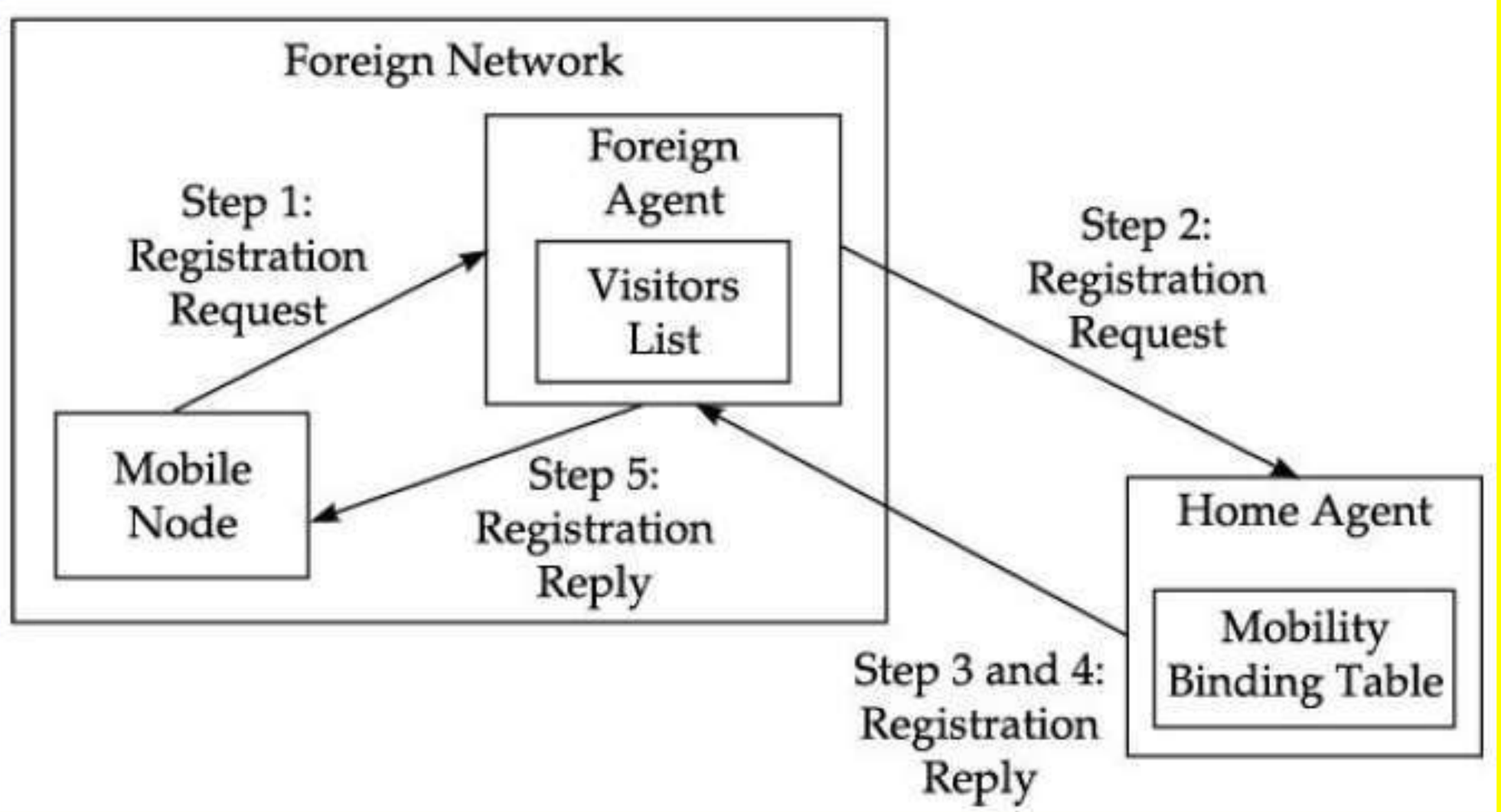
Mobile IP

Registering the care-of-address

While a node has moved to a different network, if the mobile node obtains a care-of-address from a foreign agent, then this address should be registered with the home agent.

- If the MN travels to a FN, it registers with the FA by sending a registration request message which includes the permanent IP address of the mobile host and the IP address of its HA.
- The FA in turn performs the registration process on behalf of the mobile host by sending a Registration Request containing the permanent IP address of the MN and the IP address of the FA (COA) to the HA.
- When the HA receives the Registration Request, it updates the mobility binding by associating the COA of the MN with its home address.
- The HA then sends an acknowledgement to the FA.
- The FA in turn updates its visitors list by inserting the entry for the MN and relays the reply to the mobile node

Mobile IP


Foreign Network
Foreign Agent
Visitors List
Step 1: Registration Request
Step 2: Registration Request
Mobile Node
Step 5: Registration Reply
Home Agent
Mobility Binding Table
Step 3 and 4: Registration Reply

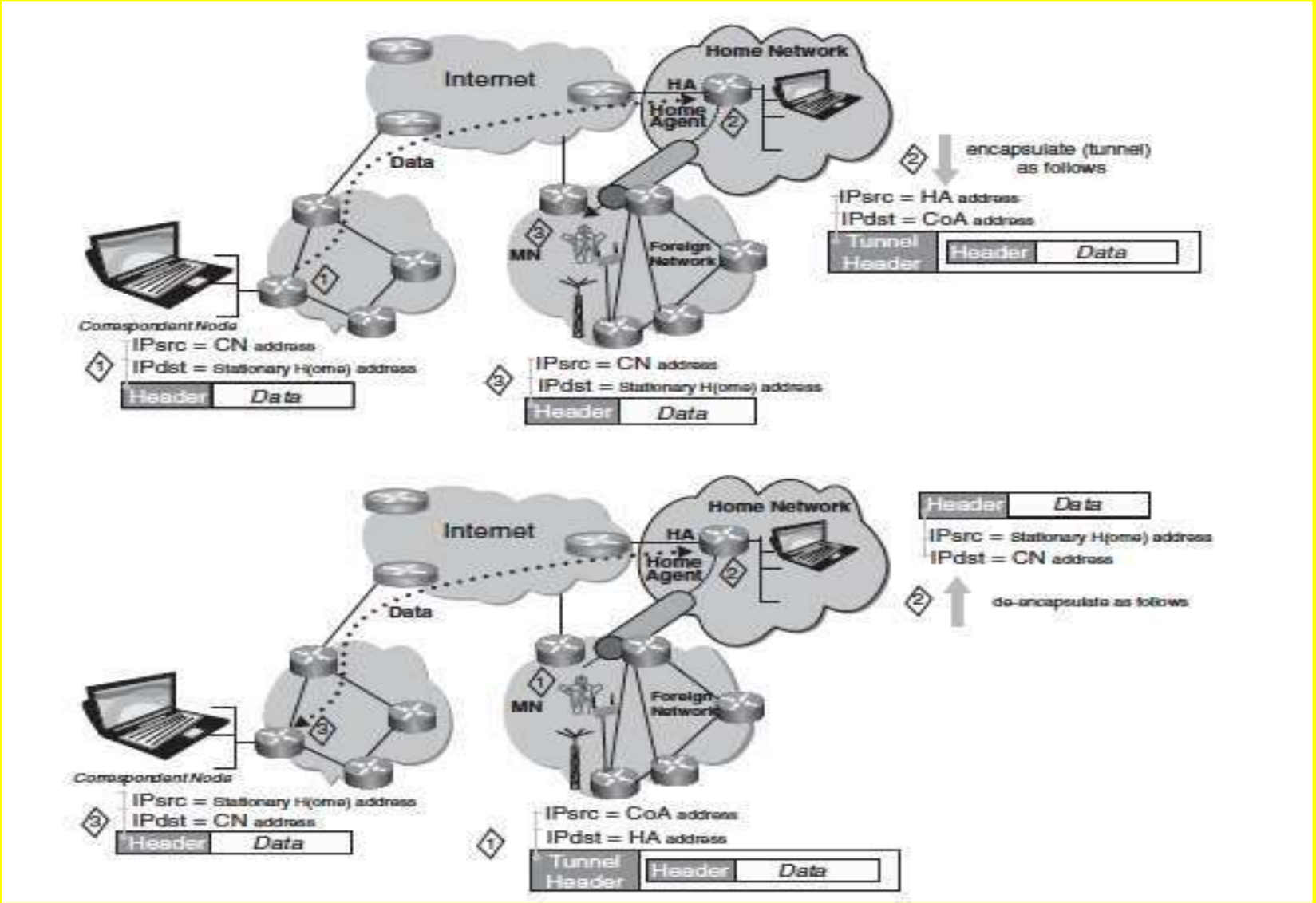
Mobile IP

Tunnelling to the care-of-address

Tunnelling takes place to forward an IP datagram from the home agent to a care-of- address. This involves carrying out the following steps:

- When a home agent receives a packet addressed to a mobile host, it forwards the packet to the care-of-address using IP-within-IP (encapsulation).
- Using IP-within-IP, the home agent inserts a new IP header in front of the IP header of any datagram.
- Destination address is set to the care-of-address.
- Source address is set to the home agent's address.
- After stripping out the first header, IP processes the packet again.

Mobile IP


Internet
Home Network
HA
Home Agent
Data
MN
Foreign Network
Correspondent Node
IPsrc = CN address
IPdst = Stationary H(ome) address
Header
Data
encapsulate (tunnel) as follows
IPsrc = HA address
IPdst = CoA address
Tunnel Header
Header
Data
IPsrc = CN address
IPdst = Stationary H(ome) address
Header
Data
Internet
Home Network
HA
Home Agent
Data
MN
Foreign Network
Correspondent Node
IPsrc = Stationary H(ome) address
IPdst = CN address
Header
Data
IPsrc = CoA address
IPdst = HA address
Tunnel Header
Header
Data
Header
Data
IPsrc = Stationary H(ome) address
IPdst = CN address
de-encapsulate as follows

Mobile IP

Tunnelling to the care-of-address

Bidirectional tunneling

In this approach, the HA plays a crucial role, although this implies that the network traffic to this node can be high; however, the CN has no requirements related to mobility support—also, the MNs have no direct visibility related to the CN.

Direct routing (aka route optimization)

In the mobile IP protocol, all the data packets to the mobile node go through the home agent. Because of this there will be heavy traffic between HA and CN in the network, causing latency to increase. Therefore, the following route optimization needs to be carried out to overcome this problem.

- Enable direct notification of the corresponding host
- Direct tunnelling from the corresponding host to the mobile host
- Binding cache maintained at the corresponding host

Mobile IP

TABLE 4.1 Messages Transmitted in Optimized Mobile IP	
Message type	*Description*
1. Binding request	If a node wants to know the current location of a mobile node (MN), it sends a request to home agent (HA).
2. Binding acknowledgement	On request, the node will return an acknowledgement message after getting the binding update message.
3. Binding update	This is a message sent by HA to CN mentioning the correct location of MN. The message contains the fixed IP address of the mobile node and the care-of-address. The binding update can request for an acknowledgement.
4. Binding warning	If a node decapsulates a packet for a mobile node (MN), but it is not the current foreign agent (FA), then this node sends a binding warning to the home agent (HA) of the mobile node (MN).

THANK YOU