

CSS2C08

COMPUTER NETWORKS

MODULE 3

1. Network layer services
2. Routing
3. IP
4. Routing in internet
5. Router
6. IPV6
7. Multicast routing
8. Mobility

Mobility

- Mobility refers to the ability of the user or other mobile entity to communicate and access services, irrespective of any changes in the location or in the technical access environment. Accordingly, mobile management is the set of functions that are used to provide mobility support.

- **Classifications of mobility**
 - Based on the mobility support level
 - Seamless mobility
 - Nomadic mobility
 - Based on the Mobility Range
 - IP field(IETF)
 - Macro-mobility
 - Micro-mobility
 - Telecommunications field(ITU-T)
 - Intra-AN mobility
 - Inter-AN mobility
 - Inter-CN mobility
 - Based on the access technology types
 - Horizontal mobility
 - Vertical mobility

➤ **Classifications of mobility:**

- ❖ Based on the **mobility support level** (i.e., the service continuity), mobility can be classified into seamless mobility or nomadic mobility.
 - In **seamless mobility**, the user/terminal can change the network access point without interrupting the current service session.
 - In **nomadic mobility**, the service session will be stopped completely and will start again when the network access point is changed.
 - The essential difference between seamless mobility and nomadic mobility is therefore whether or not they support service continuity

❖ Based on the **Mobility Range**, mobility can be classified into:

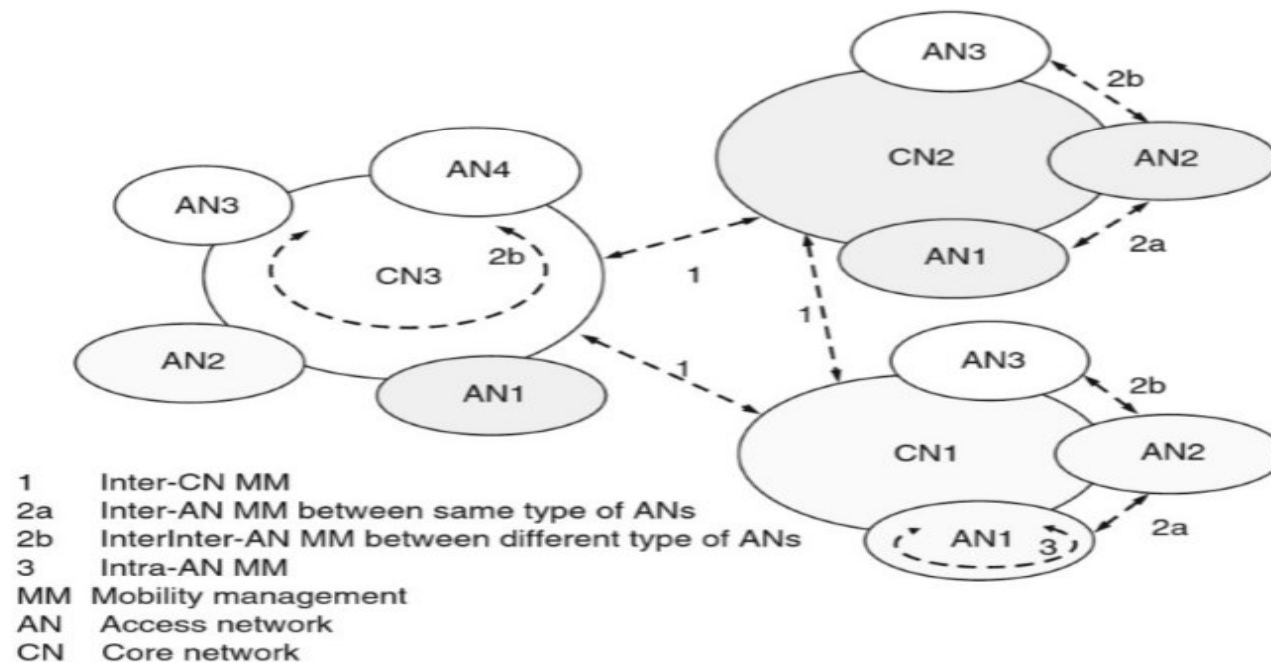
- The **IETF** defines macro-mobility and micro-mobility in the **IP field**

- ✓ **Macro-mobility**, which is also called global mobility, is the mobility over a large area and usually means the mobility across IP domains.

- ✓ **Micro-mobility**, which is also called local mobility, is the mobility over a small area and usually refers to the mobility within an IP domain .

- The **ITU Telecommunication Standardization Sector (ITU-T)** defines intra-AN mobility, inter-AN mobility, and inter-CN mobility in the **telecommunications field** .

- ✓ **Intra-AN mobility:** refer to the mobility within an AN
- ✓ **Inter-AN mobility:** across different ANs belonging to the same CN
- ✓ **Inter-CN mobility:** across different CNs, respectively.



Classification of mobility based on the mobility range in ITU-T

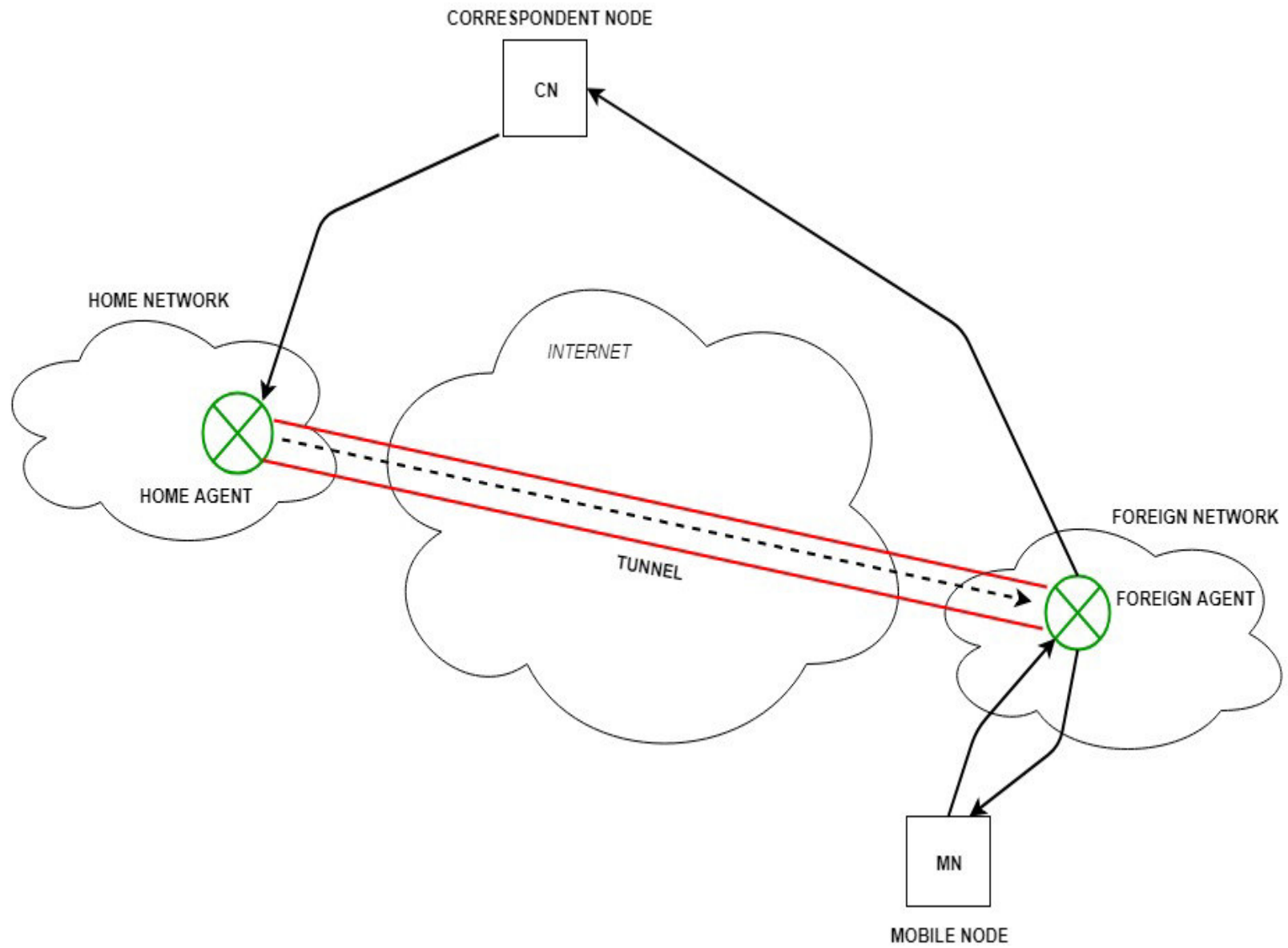
❖ Based on the **access technology types** , mobility can be classified into horizontal mobility and vertical mobility

- **Horizontal mobility** refers to the mobility within the same access technology .
- **Vertical mobility** refers to the mobility between different types of access technology .

Mobile Internet Protocol

- **Mobile IP** is a communication protocol that allows the users to move from one network to another with the same IP address. It ensures that the communication will continue without user's sessions or connections being dropped.
- **Components of Mobile IP**
 1. Mobile Node (MN)
 2. Home Network
 3. Home Agent (HA)
 4. Home Address
 5. Foreign Network
 6. Foreign Agent (FA)
 7. Correspondent Node (CN)
 8. Care of Address (COA)

1. **Mobile Node (MN):**It is the hand-held communication device that the user carries e.g. Cell phone.
2. **Home Network:** It is a network to which the mobile node originally belongs to as per its assigned IP address (home address).
3. **Home Agent (HA):** It is a router in home network to which the mobile node was originally connected.
4. **Home Address:** It is the permanent IP address assigned to the mobile node (within its home network).
5. **Foreign Network:** It is the current network to which the mobile node is visiting (away from its home network).
6. **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 delivers it to the mobile node.
7. **Correspondent Node (CN):**It is a device on the internet communicating to the mobile node.
8. **Care of Address (COA):**It is the temporary address used by a mobile node while it is moving away from its home network.



- 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 into 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 between the home agent and the foreign agent by the process of tunneling.
- Tunneling establishes a virtual pipe for the packets available between a tunnel entry and an endpoint. 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 packets into new packets in which the source address is the home address and destination is the care-of-address and sends it through the tunnel to the foreign agent. Foreign agent, on other side of the tunnel receives the data packets, decapsulates them and sends them to the mobile node. Mobile node in response to the data packets received, sends a reply in response to foreign agent. Foreign agent directly sends the reply to the correspondent node.

➤ **Key Mechanisms in Mobile IP**

- 1. Agent Discovery:** Agents advertise their presence by periodically broadcasting their agent advertisement messages. The mobile node receiving the agent advertisement messages observes whether the message is from its own home agent and determines whether it is in the home network or foreign network.
- 2. Agent Registration:** Mobile node after discovering the foreign agent, sends registration request (RREQ) to the foreign agent. Foreign agent in turn, sends the registration request to the home agent with the care-of-address. Home agent sends registration reply (RREP) to the foreign agent. Then it forwards the registration reply to the mobile node and completes the process of registration.

3. Tunnelling:It establishes a virtual pipe for the packets available between a tunnel entry and an endpoint. It is the process of sending a packet via a tunnel and it is achieved by a mechanism called encapsulation. It takes place to forward an IP datagram from the home agent to the care-of-address. Whenever home agent receives a packet from correspondent node, it encapsulates the packet with source address as home address and destination as care-of-address.