



Communications & Electronics Engineering Dept.

Part 8

Mobile IP & Wireless Application protocol

# Communication Networks

## (650536)

**Prerequisite:** **Digital Communications** (610533)

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### **Text Book**

*Wireless Communications & Networking.*

*William Stallings Published by:*

*Pearson Education, 2002*

# Mobile IP & Wireless Application protocol

## Mobile IP:

Mobile IP was developed :

1. To enable computers (mobile computers) to maintain internet connectivity while moving from one internet attachment point to another.
2. Because IP suited to wireless connections [ Computer is unplugged from physical attachment to another]

Operation of mobile IP:

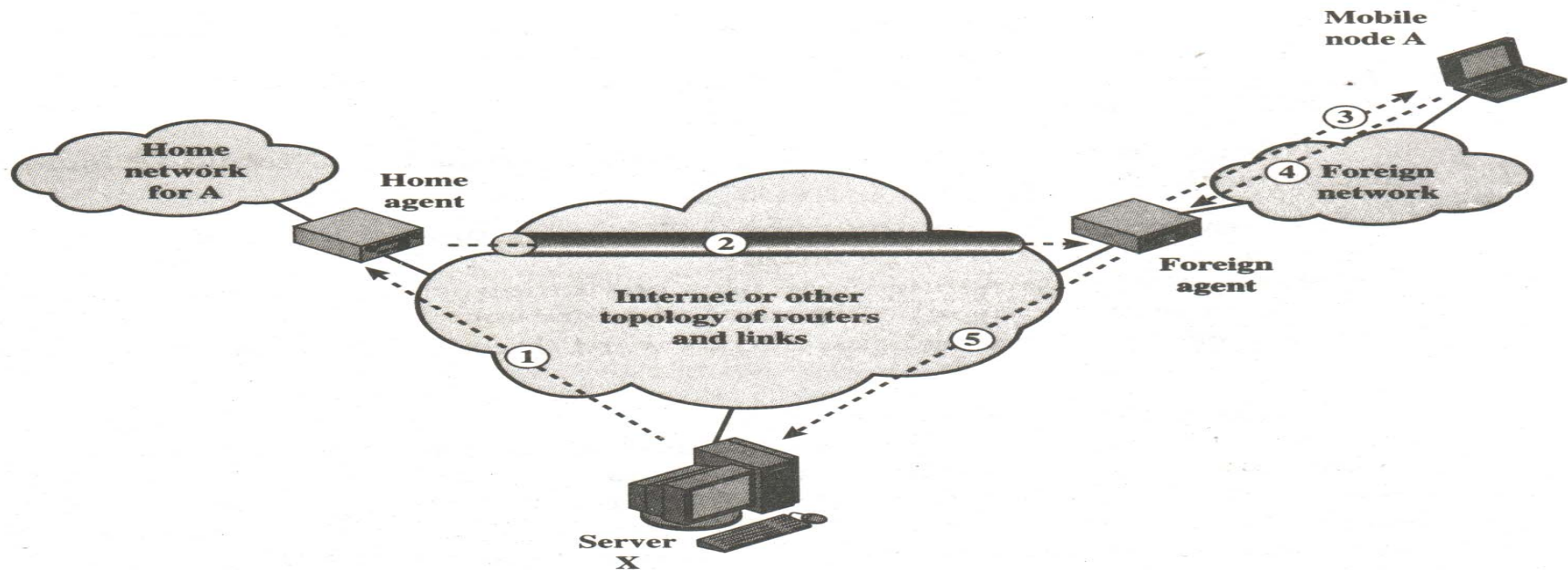
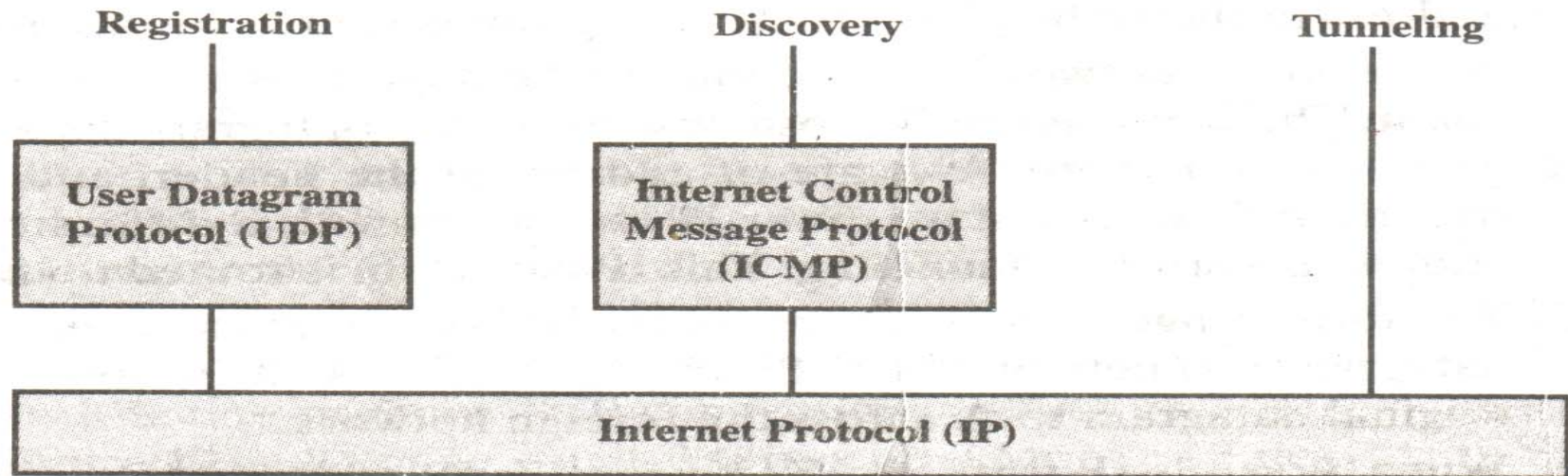


Figure 12.1 Mobile IP Scenario

# Discovery

- Agent discovery makes use of Internet control message protocol (ICMP) router advertisement messages, with one or more extensions specific to Mobile IP.
- The mobile node must determine if it is attached to its home network or to a foreign network.
- Discovery for a mobile node is a continuous process, because the transition from a network to another can occur at any time without notification to the network layer.



**Figure 12.2** Protocol Support for Mobile IP



**Table 12.1** Mobile IP Terminology (RFC 2002)

<b>Mobile node</b>	A host or router that changes its point of attachment from one network or subnetwork to another. A mobile node may change its location without changing its IP address; it may continue to communicate with other Internet nodes at any location using its (constant) IP address, assuming link-layer connectivity to a point of attachment is available
<b>Home address</b>	An IP address that is assigned for an extended period of time to a mobile node. It remains unchanged regardless of where the node is attached to the Internet.
<b>Home agent</b>	A router on a mobile node's home network which tunnels datagrams for delivery to the mobile node when it is away from home, and maintains current location information for the mobile node.
<b>Home network</b>	A network, possibly virtual, having a network prefix matching that of a mobile node's home address. Note that standard IP routing mechanisms will deliver datagrams destined to a mobile node's Home Address to the mobile node's Home Network.
<b>Foreign agent</b>	A router on a mobile node's visited network which provides routing services to the mobile node while registered. The foreign agent detunnels and delivers datagrams to the mobile node that were tunneled by the mobile node's home agent. For datagrams sent by a mobile node, the foreign agent may serve as a default router for registered mobile nodes.
<b>Foreign network</b>	Any network other than the mobile node's Home Network.
<b>Care-of address</b>	The termination point of a tunnel toward a mobile node, for datagrams forwarded to the mobile node while it is away from home. The protocol can use two different types of care-of address: a "foreign agent care-of address" is an address of a foreign agent with which the mobile node is registered, and a "co-located care-of address" is an externally obtained local address which the mobile node has associated with one of its own network interfaces.
<b>Correspondent node</b>	A peer with which a mobile node is communicating. A correspondent node may be either mobile or stationary.
<b>Link</b>	A facility or medium over which nodes can communicate at the link layer. A link underlies the network layer.
<b>Node</b>	A host or a router.
<b>Tunnel</b>	The path followed by a datagram while it is encapsulated. The model is that, while it is encapsulated, a datagram is routed to a knowledgeable decapsulating agent, which decapsulates the datagram and then correctly delivers it to its ultimate destination.



Mobile IP (Nomadic )deals with dynamic IP addresses as shown in figure 12.1.

- A mobile node is assigned to a *home network* with static home address.
- The mobile node moves its attachment to another network (*Foreign network*)
- The mobile node registers with a network through a router (*foreign agent*).
- The mobile then communicates with a similar agent (*Home agent*), giving the home agent the *care-of address* of the mobile node. (the care-of address identifies the foreign agent's location)
- When the IP datagrams are exchanged, the following operations occur:
  - Server X transmits an IP with A's home address in the IP header to the A's home network..
  - The home agent encapsulates the entire datagram inside a new IP datagram which has the A' care-of-address. This IP datagram routed to the foreign agent.
  - The foreign agent encapsulates the original IP datagram and delivers the original datagram to A across the foreign network.
  - When A sends IP traffic to X, it uses X's IP address.

To support the operations , Mobile IP includes three basic capabilities:

1. **Discovery:** A mobile node uses a discovery procedure to identify prospective home agents and foreign agents.
2. **Registration:** A mobile node uses an authenticated registration procedure to inform its home agent of its care-of address.
3. **Tunneling:** is used to forward IP datagrams from a home address to a care-of address.

# Registration

- Once a mobile node has recognized that it is on a foreign network and has acquired a care-of address, it needs to alert a home agent on its home network and request that the home agent forward its IP traffic.
- The registration process involves four steps:
  1. The mobile node requests the forwarding service by sending a registration request to the foreign agent that the mobile node wants to use.
  2. The foreign agent relays this request to the mobile node's home agent.
  3. The home agent either accepts or denies the request and sends a registration reply to the foreign agent.
  4. The foreign agent relays this reply to the mobile node.
- The registration operation uses two types of messages, carried in UDP segments.

# Tunneling

- Once a mobile node is registered with a home agent, the home agent must be able to intercept IP datagrams sent to the mobile node's home address so that these datagrams can be forwarded via tunneling.
- The Address Resolution Protocol (ARP) is a possible mechanism for this purpose.

# Wireless Application Protocol (WAP)

- Open standard developed to provide mobile users of wireless phones and other terminals access to telephony and information services, including the Internet and Web.
- WAP is designed to work with all wireless technology (GSM, CDMA and TDMA).
- WAP is based on existing Internet standards (IP,XML,HTML and HTTP)
- The limitations of devices:
  1. Limited processors
  2. Limited memory
  3. Limited battery life
  4. Limited user interface and small displays.
- The limitations of wireless networks compared to wired:
  1. Low bandwidth
  2. High latency
  3. Unpredictable availability and stability.
- The WAP specification includes the following:
  1. A programming model based on www programming model.
  2. A markup language Wireless Markup Language (WML).
  3. Small browser suitable for a mobile.
  4. lightweight communications protocol.
  5. Framework of wireless telephony applications.

