CSE 6345
Mobile Computer Systems

Topic 3 : Mobile IP

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Mobile IP

Internet Access

- Access to information
- IP connectivity
- PDAs, cellular phones etc.

Mobile IP

Internet Access

- Access to information
- IP connectivity
- PDAs, cellular phones etc.

Mobile computing – future

- No disruption of services when user changes point of attachment
- Automatic, transparent and instantaneous

IP and Mobile IP

IP:

Packets are routed to their destinations according to IP addresses

- **IP addresses are associated with a fixed network location**

Mobile IP:

- **Packets may be destined to mobile nodes**

  Providing services to mobile nodes transparently is the challenge.

Protocol Stack

Networking Layers	Standard Protocols
Applications	HTTP,NFS,SNMP,Telnet, FTP Designed for traditional networks
Transport	TCP, UDP,RTP
Network	IP, ICMP,IGMP,IPSec, Mobile IP
Data Link	IEEE 802.*, PPP
Physical	Network adapter

Protocol Stack

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ICMP: Internet Control Message protocol; IGMP : Internet group management Protocol; IPSec : Internet protocol security

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Mobile IP terminology

Home address

The IP address assigned to the mobile node, making it logically appear attached to its home network

Static address used to identify TCP connections

Mobile IP terminology

Care-of-address

An IP address at the mobile node's current point of attachment to the Internet, when it is not connected to the home network.

Mobile node's topologically significant address

Mobile IP terminology

Home Agent

Is an entity on the home network that effectively causes the mobile node to be reachable at its home address even when the mobile node is not attached to its home network.

Whenever the mobile node is not attached to the home network, home agent gets all the packets that are destined for the mobile node and delivers them to the mobile node's current point of attachment.

Mobile IP terminology

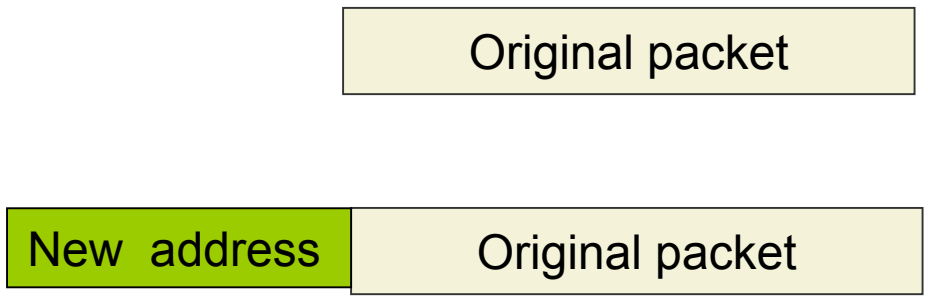
Foreign agent

A mobility agent on the foreign network that assists the mobile node in receiving datagrams delivered to the care-of-address.

Mobile IP terminology

Encapsulation/Tunneling

The process of inserting original IP packets inside another IP packet.



Working of Mobile IP

In order to maintain higher layer transparency, as the mobile node moves, the IP address should remain the same.

Mobile IP achieves this by using two IP addresses, home address and the care-of-address.

Working of Mobile IP

Mobile IP is composed of three mechanisms

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

Discovering the care-of-address

Through agent advertisements

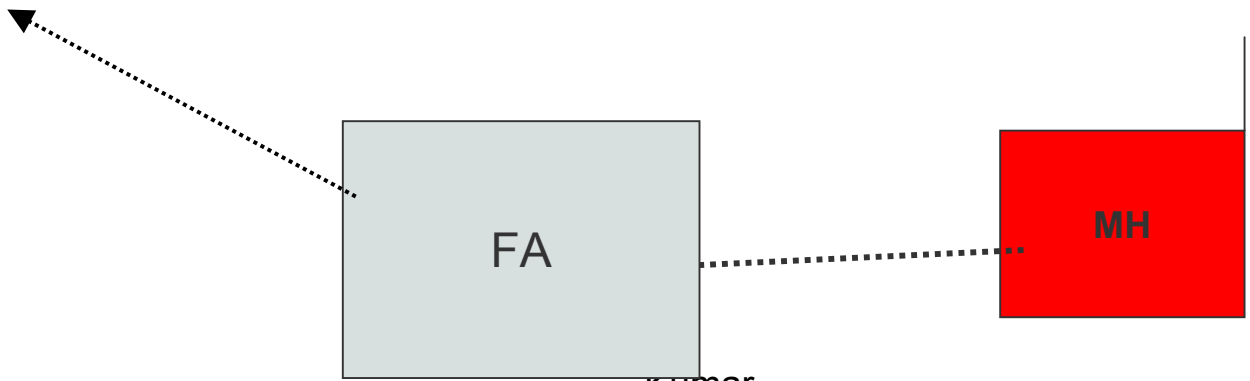
Home agent and foreign agent broadcast agent advertisements at regular intervals

Mobile node may also broadcast or multicast a request for a care-of-address

Registering care-of-address

Mobile node registers its care-of-address with the home agent (HA)

Foreign agent (FA) sends a registration request to the home agent with the care-of address information



Registering care-of-address

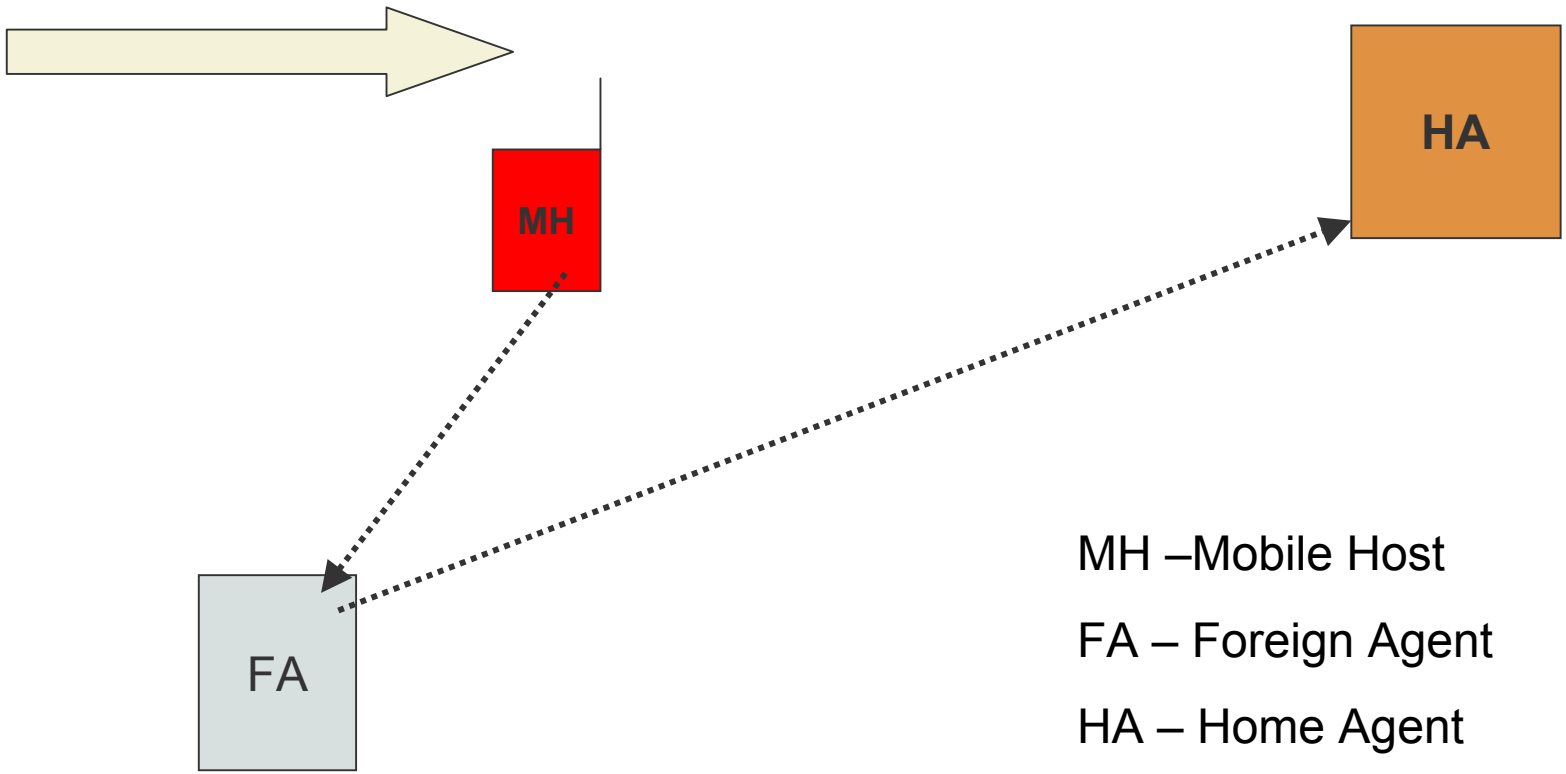
Mobile node registers its care-of-address with the home agent (HA)

Foreign agent (FA) sends a registration request to the home agent with the care-of address information

The HA adds the necessary information to the routing table, approves the request and sends a registration reply back to the mobile node.

The FA stores the mobile node's home address, home agent's address, MAC number and port number

Registering care-of-address

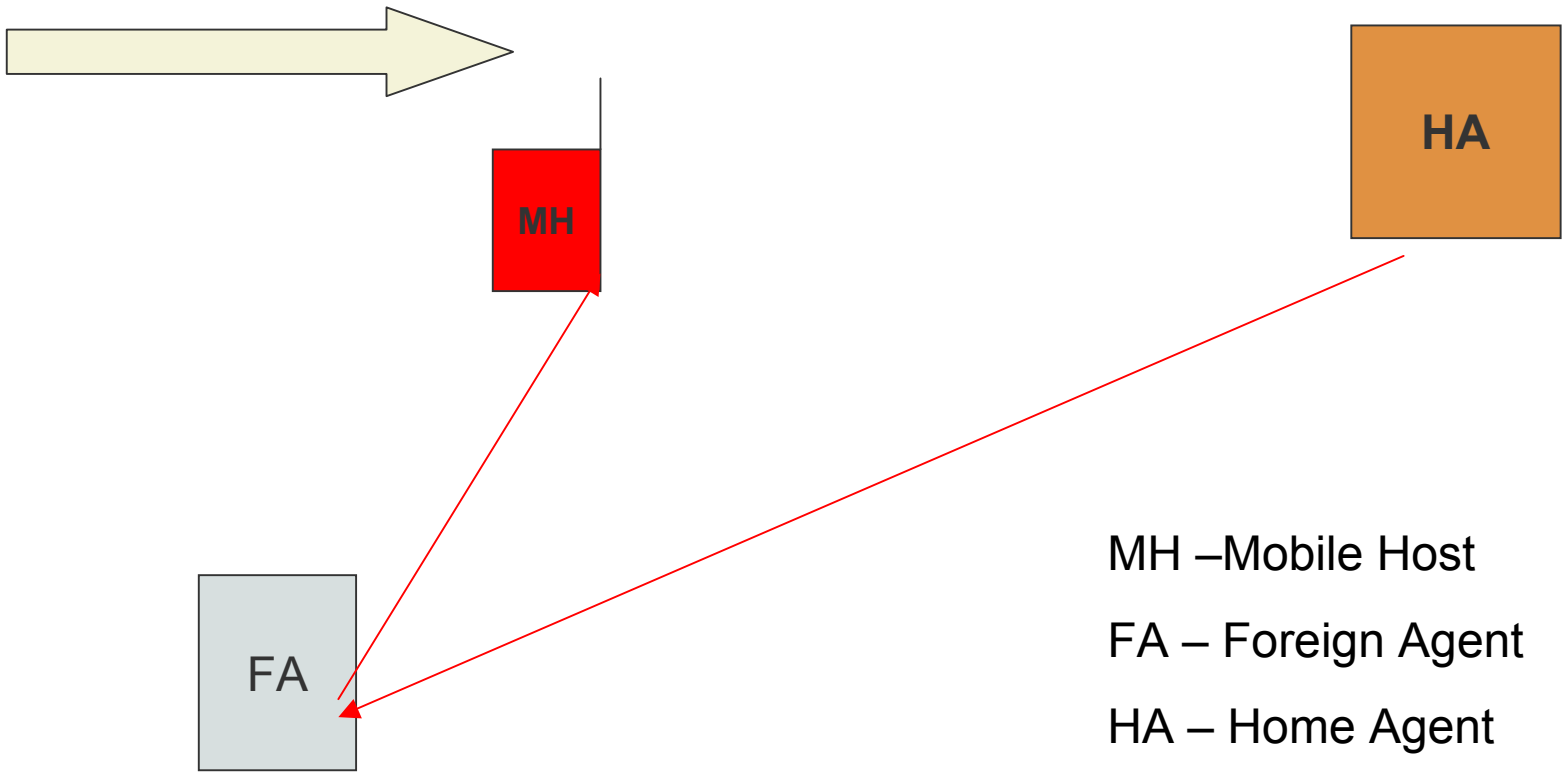


MH –Mobile Host

FA – Foreign Agent

HA – Home Agent

Registering care-of-address (Contd.)

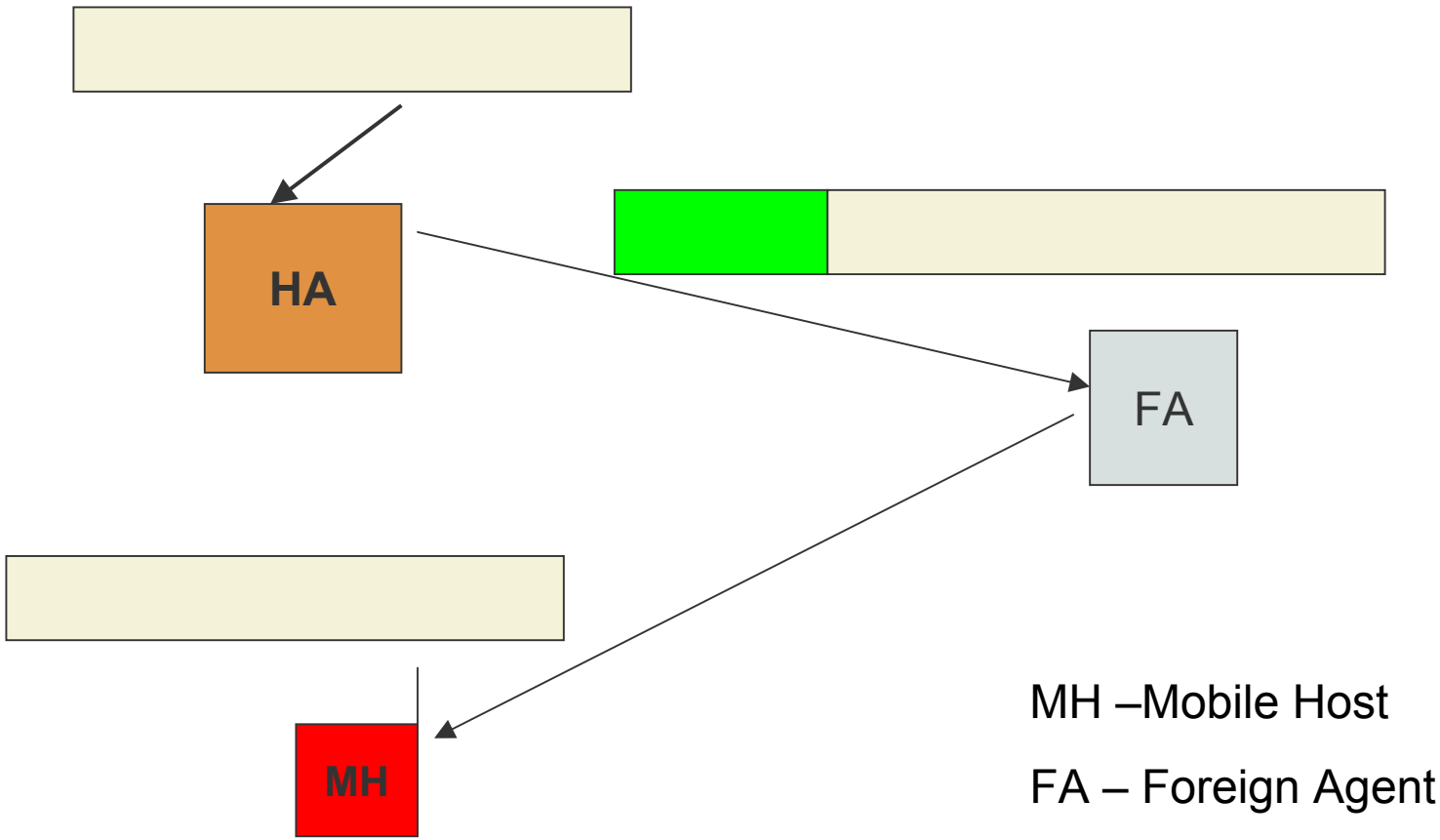


Tunneling to the care-of-address

When the HA receives a datagram addressed to the mobile node, it inserts a new IP header (tunnel header) to that datagram in front of the original IP header.

The tunnel header has mobile node's care-of-address in the destination address field and home agent's address in the source address field.

Tunneling to the care-of-address



MH –Mobile Host

FA – Foreign Agent

HA – Home Agent

Problems facing Mobile IP

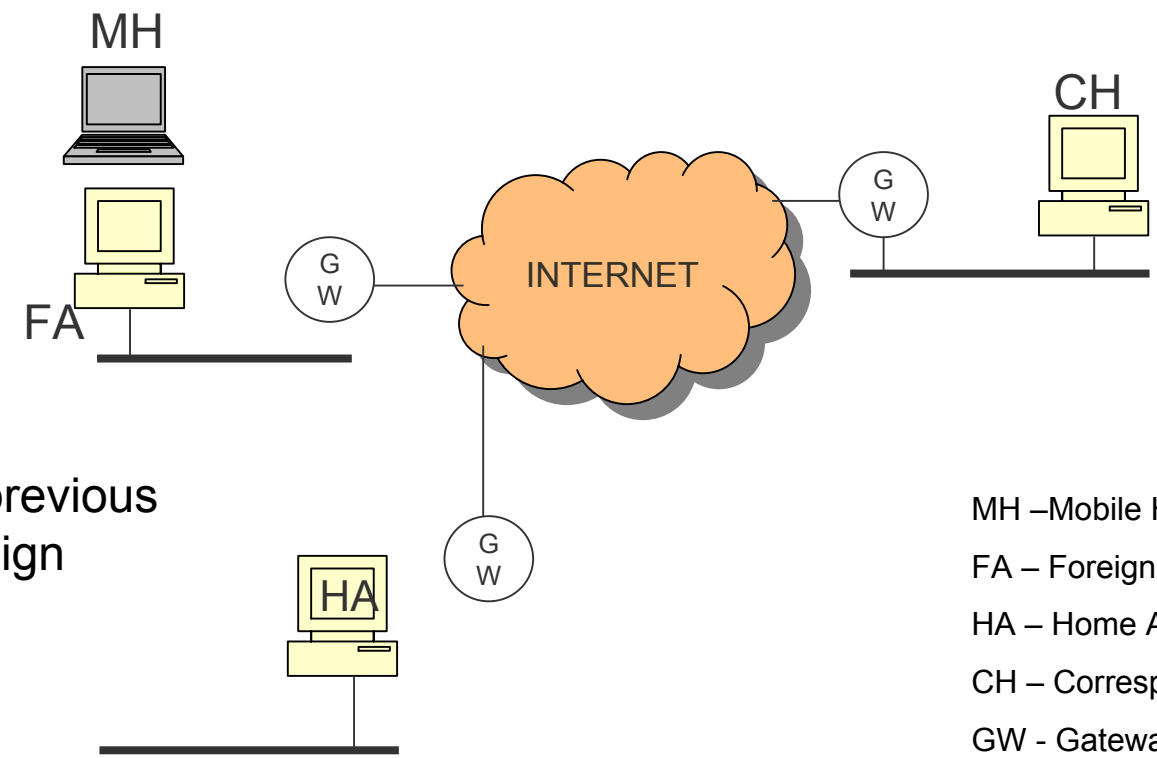
Handoff Management

Triangular routing

Ingress filtering

- Many border routers discard packets, if the source address is not one from within the network. Mobile nodes use home address as the source address, which presents the difficulty.

Mobile IP (Overview)



Handoff from previous location to foreign location

MH –Mobile Host

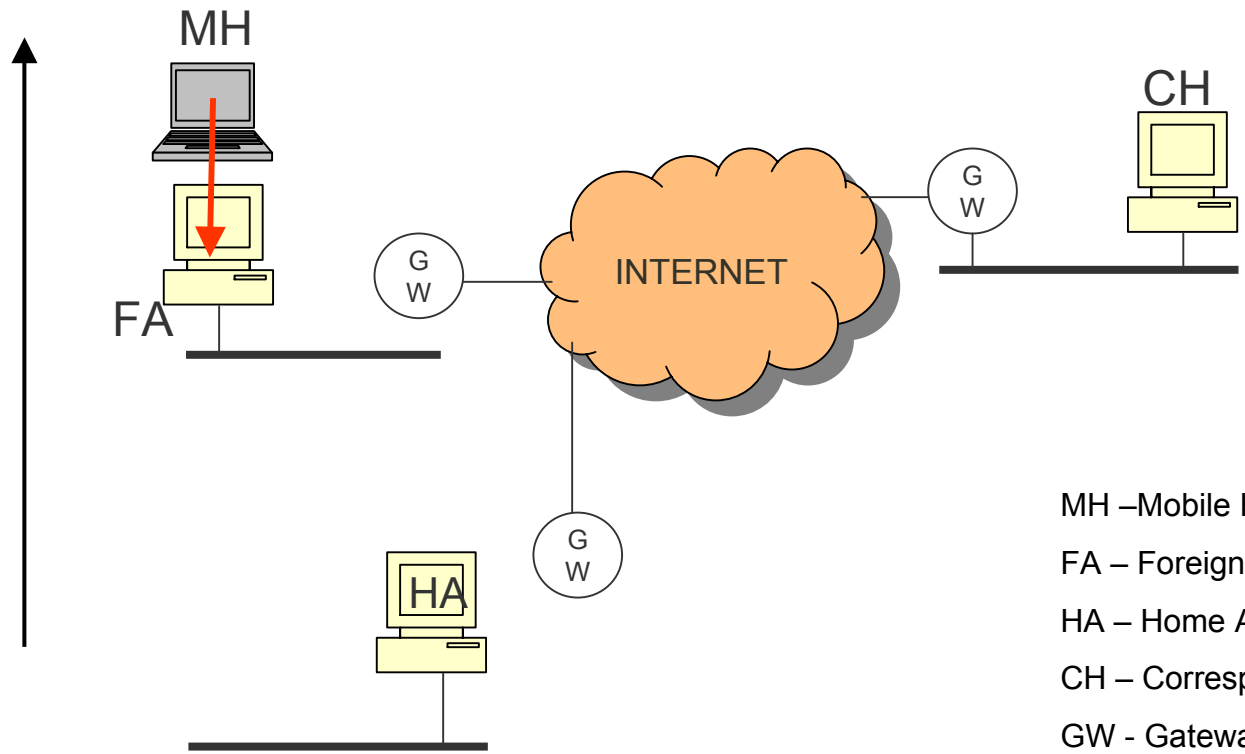
FA – Foreign Agent

HA – Home Agent

CH – Correspondent Host

GW - Gateway

Mobile IP (Overview)



MH –Mobile Host

FA – Foreign Agent

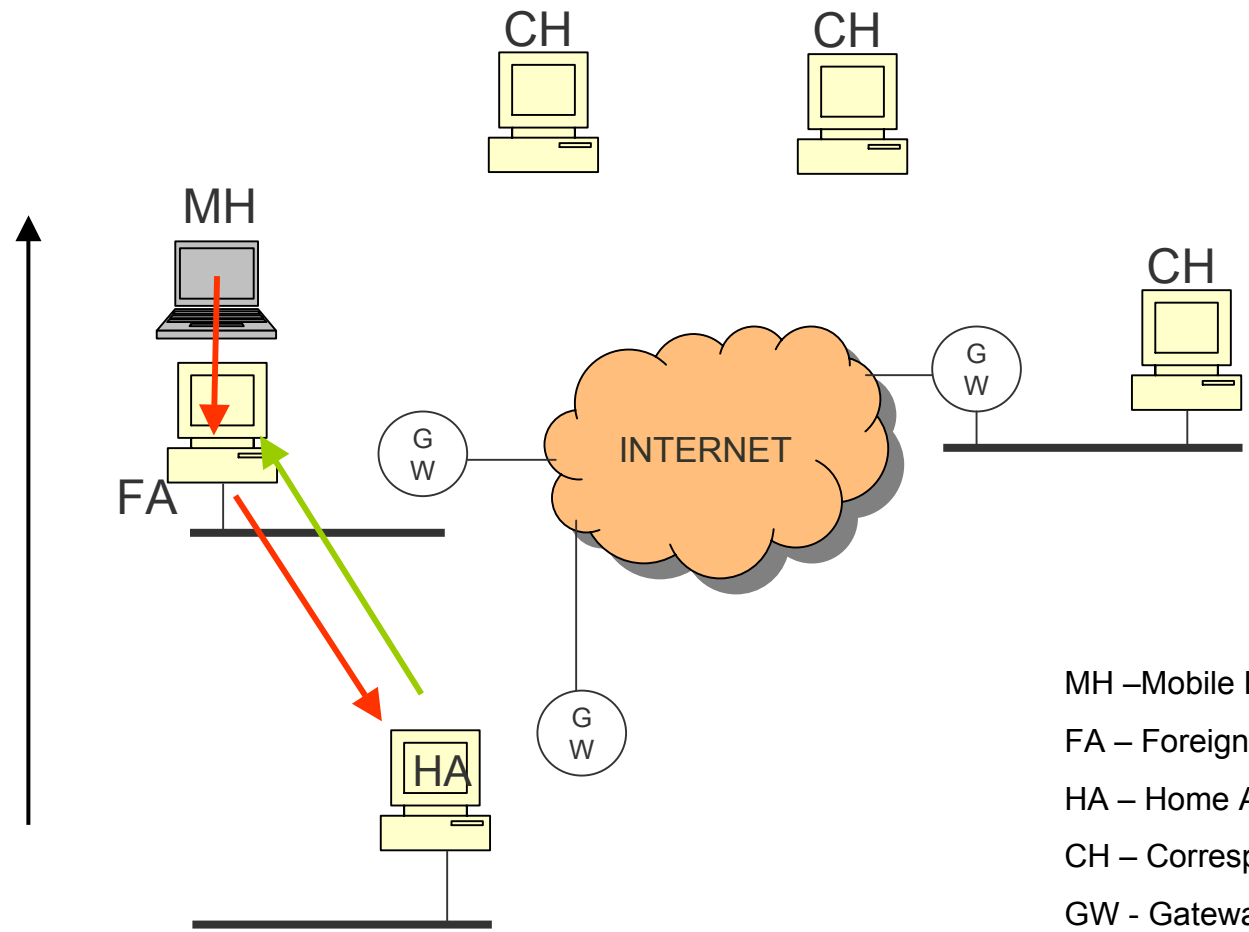
HA – Home Agent

CH – Correspondent Host

GW - Gateway

MH registers with FA

Mobile IP (Overview)



MH –Mobile Host

FA – Foreign Agent

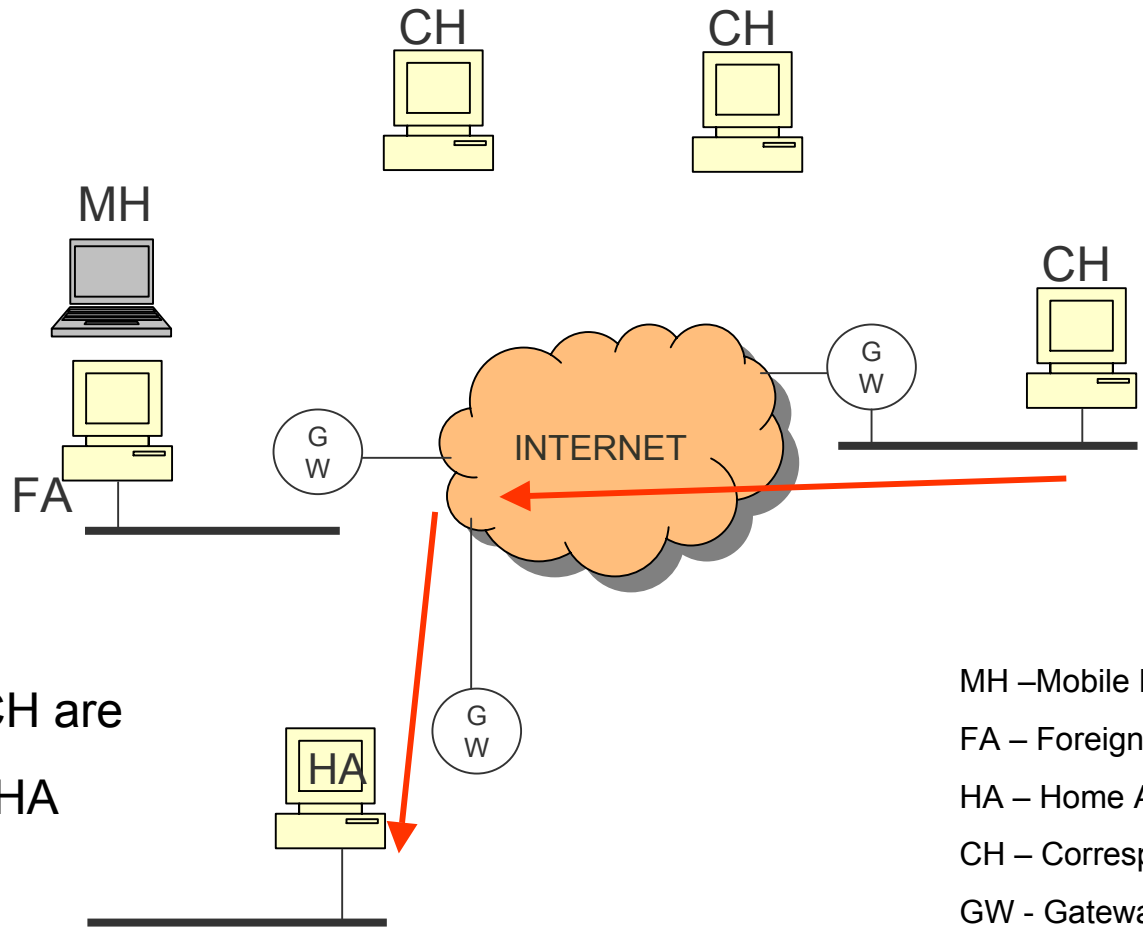
HA – Home Agent

CH – Correspondent Host

GW - Gateway

FA registers with HA and HA acknowledges

Mobile IP (Overview)



Packets from CH are

Routed to the HA

MH –Mobile Host

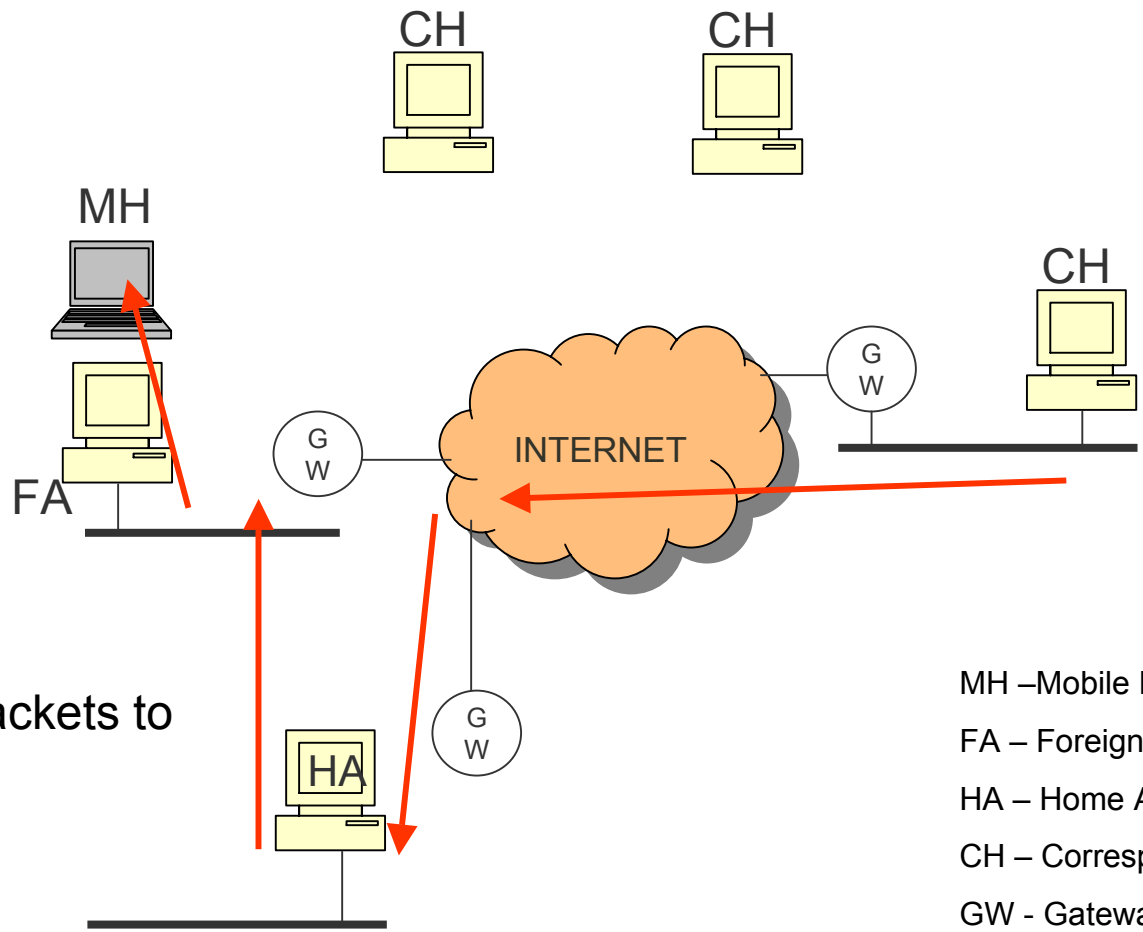
FA – Foreign Agent

HA – Home Agent

CH – Correspondent Host

GW - Gateway

Mobile IP



HA redirects packets to MH

MH –Mobile Host

FA – Foreign Agent

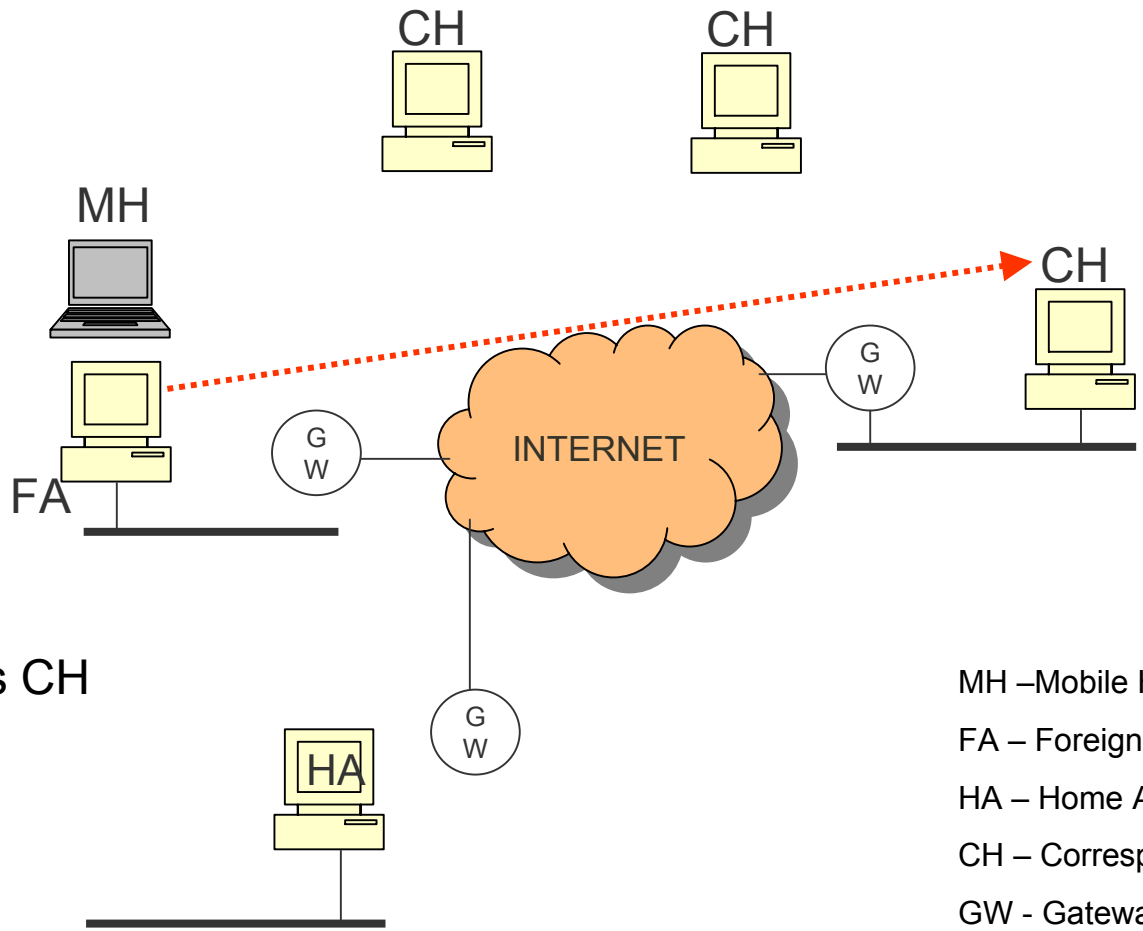
HA – Home Agent

CH – Correspondent Host

GW - Gateway

This is triangular routing

Mobile IP



FA informs CH about new location

MH –Mobile Host

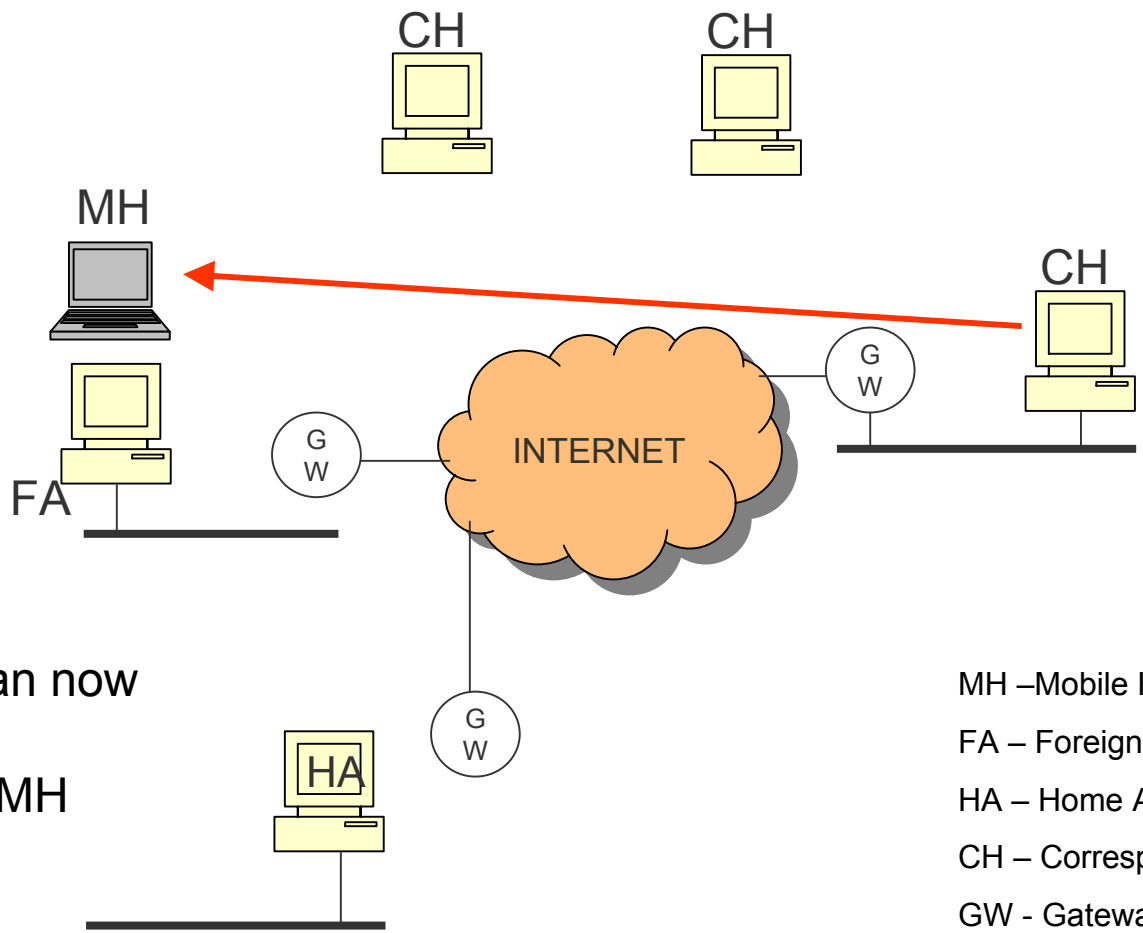
FA – Foreign Agent

HA – Home Agent

CH – Correspondent Host

GW - Gateway

Mobile IP



Packets can now be Routed directly to MH

MH –Mobile Host

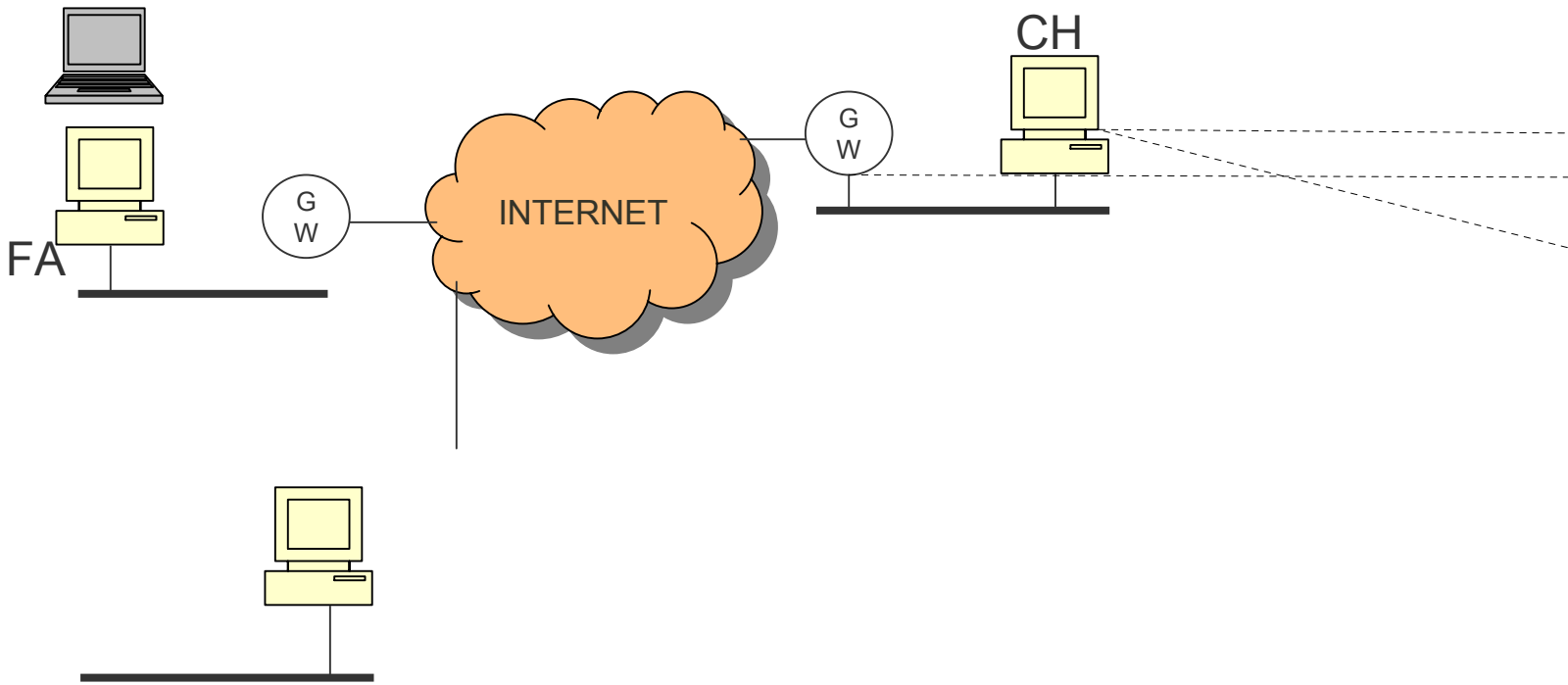
FA – Foreign Agent

HA – Home Agent

CH – Correspondent Host

GW - Gateway

Mobile IP



Mobile IP

Problems

Solutions

Research challenges

Triangle Routing