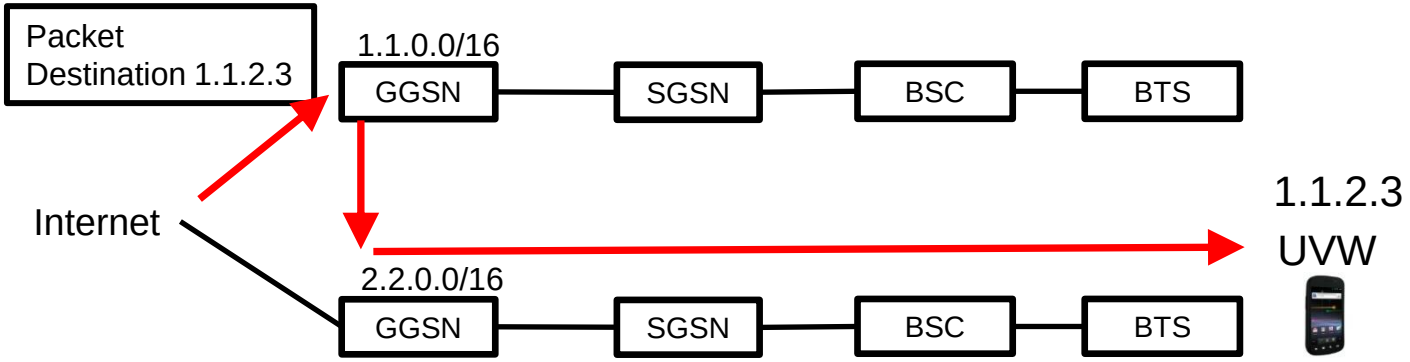
Mobile IP

Mobility and the IP address

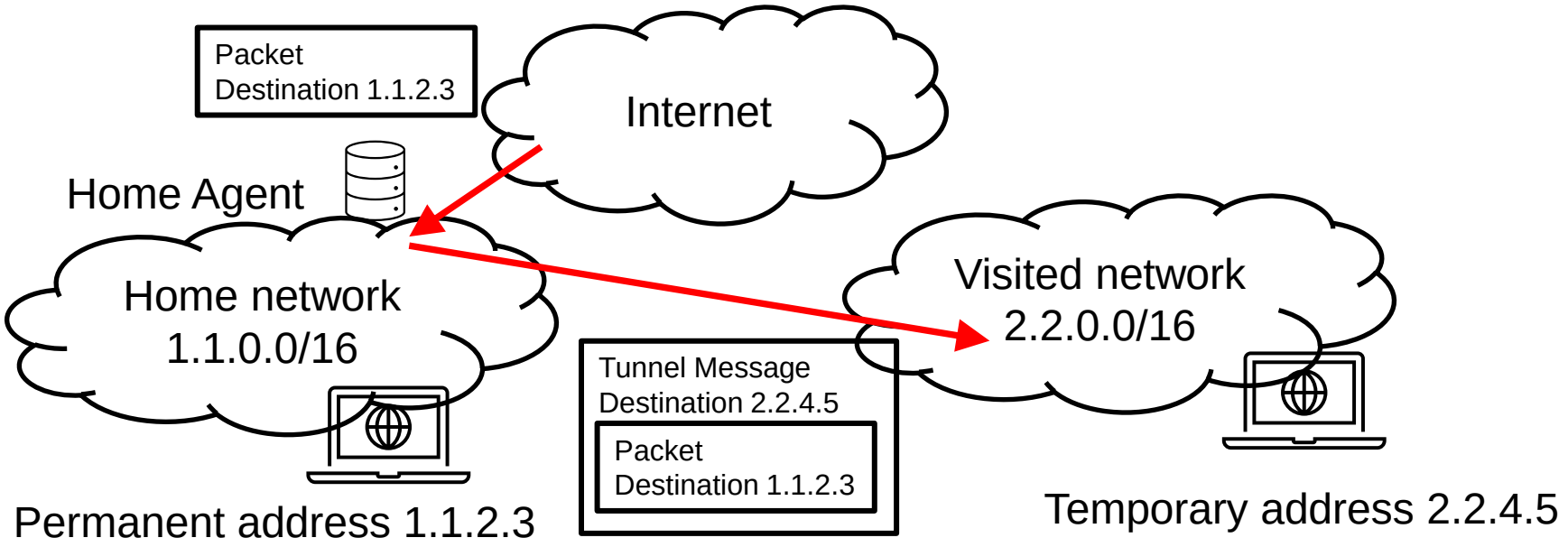
- We have seen how GSM/GPRS makes it possible that a MS keeps its IP address despite roaming
  1. Core network assigns a publicly visible IP address (1.1.2.3) to the MS
  2. The MS has an internal address (“UVW”) only known to the core network
  3. The core network's gateway tunnels incoming Internet traffic to the MS



- A similar solution also exists for non-phone devices: Mobile IPv4 (RFC 5944) and Mobile IPv6 (RFC 6275)

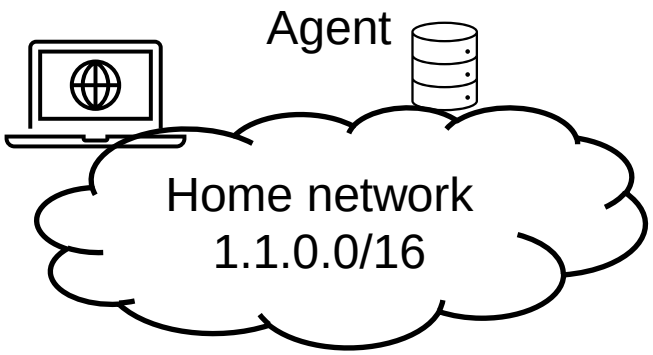
Mobile IP: Quick Overview

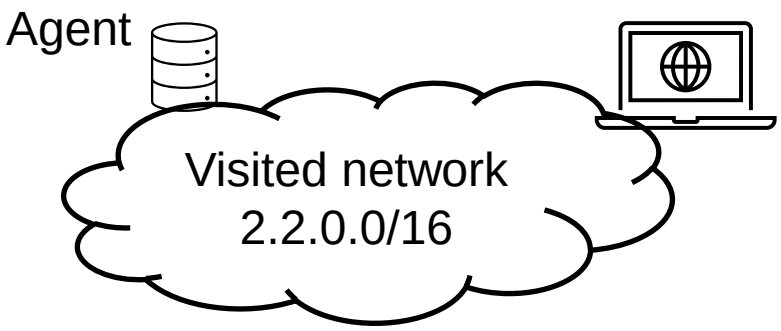
- Mobile node (MN) (e.g. a laptop) has a home network + a *permanent* address from the home network
- If MN moves to another ("visited") network it will receive a *temporary address* from that network
- A *Home Agent* will tunnel incoming Internet traffic for MN's permanent address to MN's temporary address



Agent Discovery

- Each participating network has an *agent.* We call
  - *home agent (HA)* = agent of home network
  - *foreign agent (FA)* = agent of visited network
- Agents send periodically an *Agent Advertisement message* (over ICMP) into their network
  - MN can also explicitly request an advertisement message by sending an *Agent Solitation* message
- Thanks to the advertisement messsage, a MN can see whether it is in its home network or in a foreign network





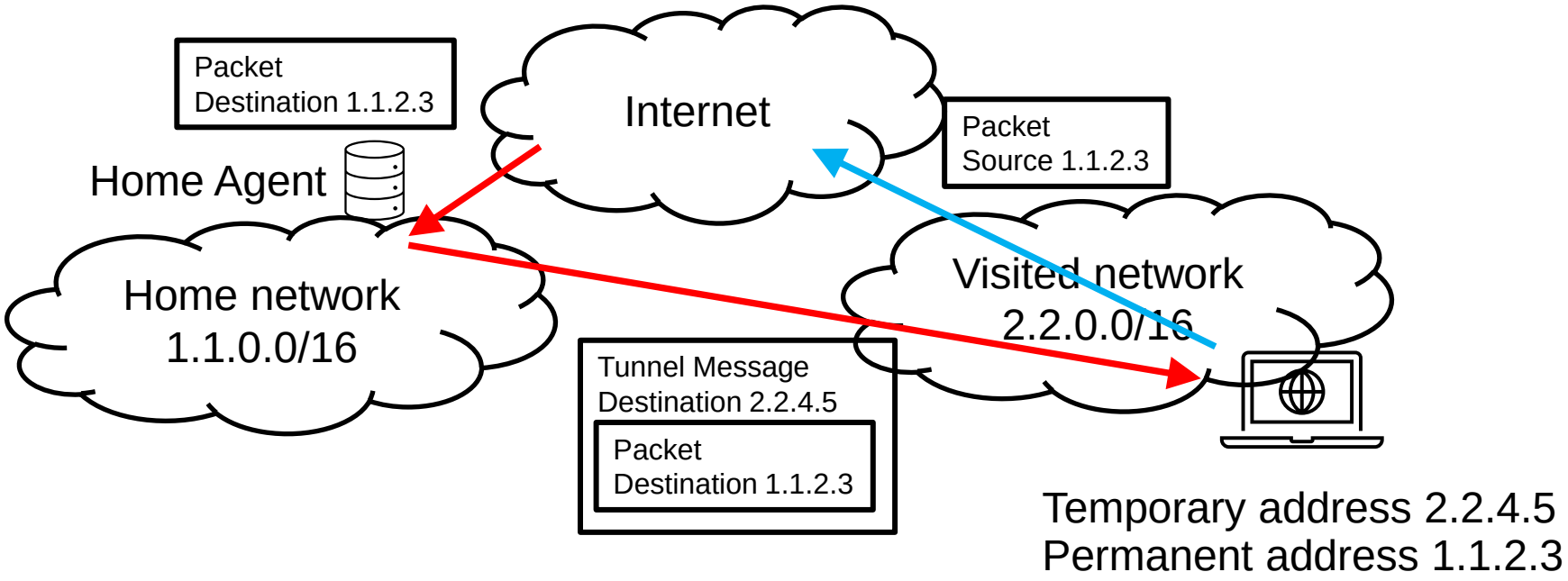
Registration

Steps:

1. MN sends a *registration request* over UDP to the foreign agent (FA). Request contains
   - Home address of the MN + address of the home agent
   - Authentication information
2. FA will forward this information to the HA to inform the HA that the MN wants to visit the foreign network
3. If HA gives ist okay, FA replies to MN with a *registration reply* message
4. The MN is now registered in the foreign network and has obtained a foreign care-of-address (COA)

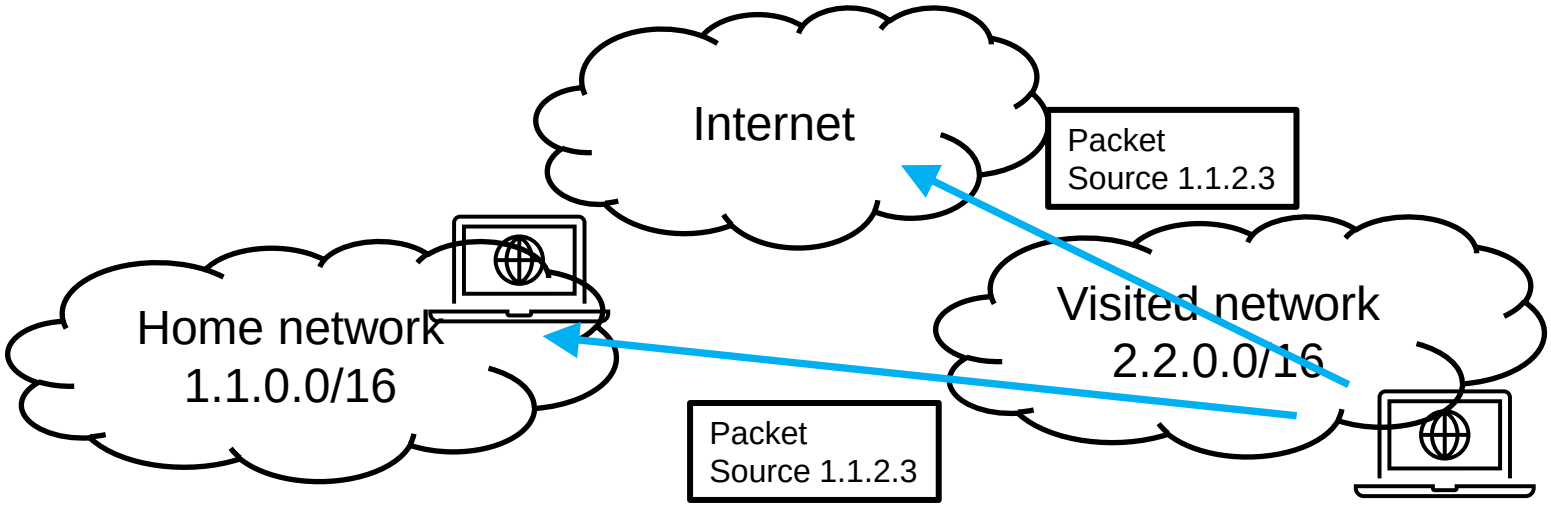
Triangular Routing

- Triangular Routing (default in Mobile IP for IPv4):
  - Traffic *to the MN* is sent to the home router and then tunneled to the visited network
  - Traffic *from the MN* to the Internet is sent directly from the MN to the destination



Triangular Routing (2)

- Simple and efficient but does not always work:
  - The ISP of the foreign network might do filtering and reject outgoing packets with MN's home address as sender address
  - The ISP of the home network might reject incoming packets with MN's home address as sender address (e.g. if MN wants to communicate with a node in the home network)



Temporary address 2.2.4.5
Permanent address 1.1.2.3

Reverse Tunneling

- Alternative to triangular routing: Reverse Tunneling
  - Both directions are tunneled
- Less efficient but more robust
- Reverse tunneling is default in Mobile IPv6