

Mobile and Ubiquitous Computing

Mobile IP

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Motivation for Mobile IP

- Routing
 - based on IP destination address, network prefix (e.g. 129.13.42) determines physical subnet
 - change of physical subnet implies change of IP address to have a topological correct address (standard IP) or needs special entries in the routing tables
 - TCP connections break, security problems

Motivation for Mobile IP

- Specific routes to end-systems?
 - change of all routing table entries to forward packets to the right destination
 - does not scale with the number of mobile hosts and frequent changes in the location, security problems
- Changing the IP-address?
 - adjust the host IP address depending on the current location
 - almost impossible to find a mobile system, DNS updates take to long time
 - TCP connections break, security problems

Requirements to Mobile IP

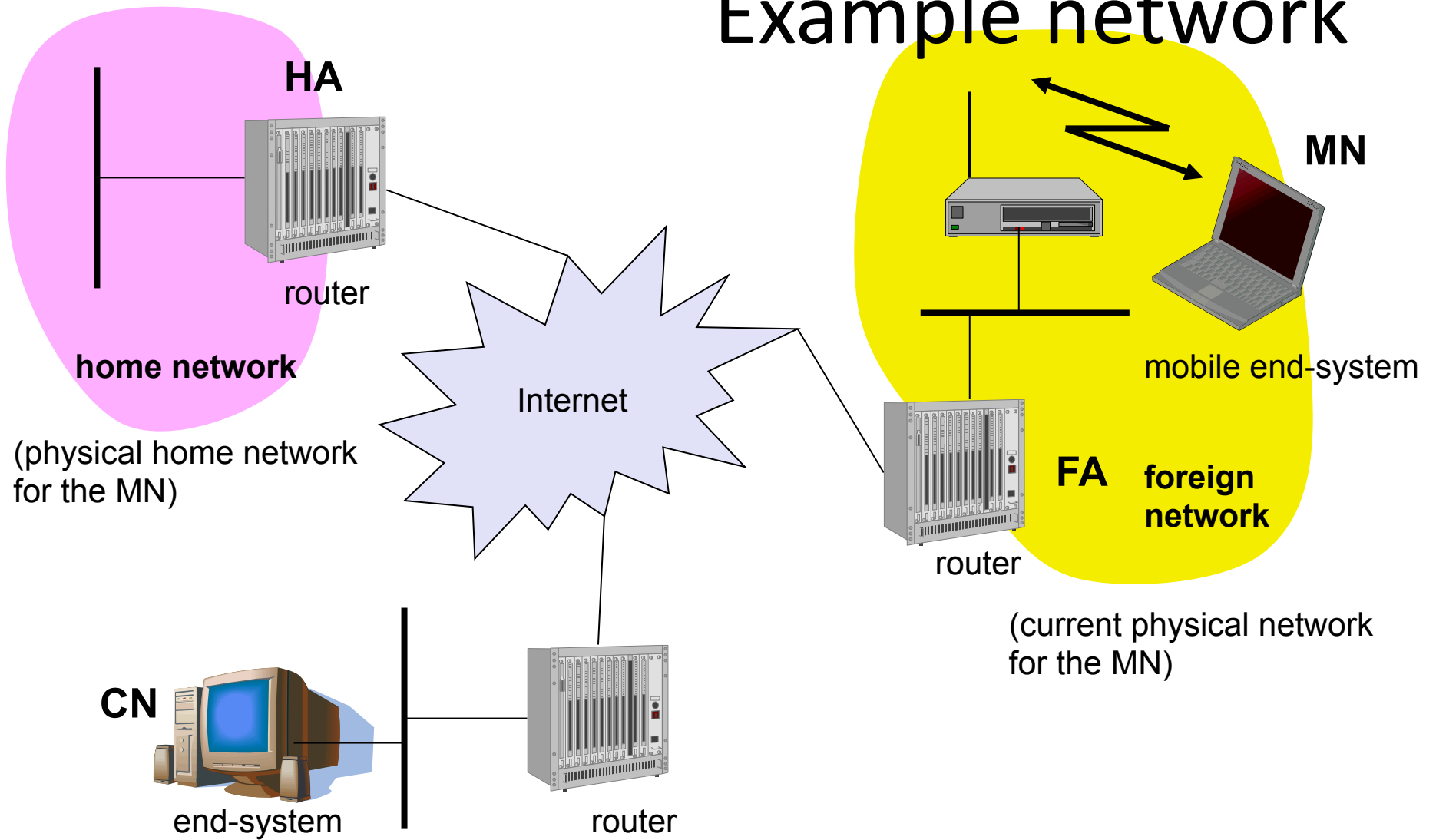
- Transparency
 - mobile end-systems keep their IP address
 - continuation of communication after interruption of link possible
 - point of connection to the fixed network can be changed
- Compatibility
 - support of the same layer 2 protocols as IP
 - no changes to current end-systems and routers required
 - mobile end-systems can communicate with fixed systems
- Security
 - authentication of all registration messages
- Efficiency and scalability
 - only little additional messages to the mobile system required (connection typically via a low bandwidth radio link)
 - world-wide support of a large number of mobile systems in the whole Internet

Terminology

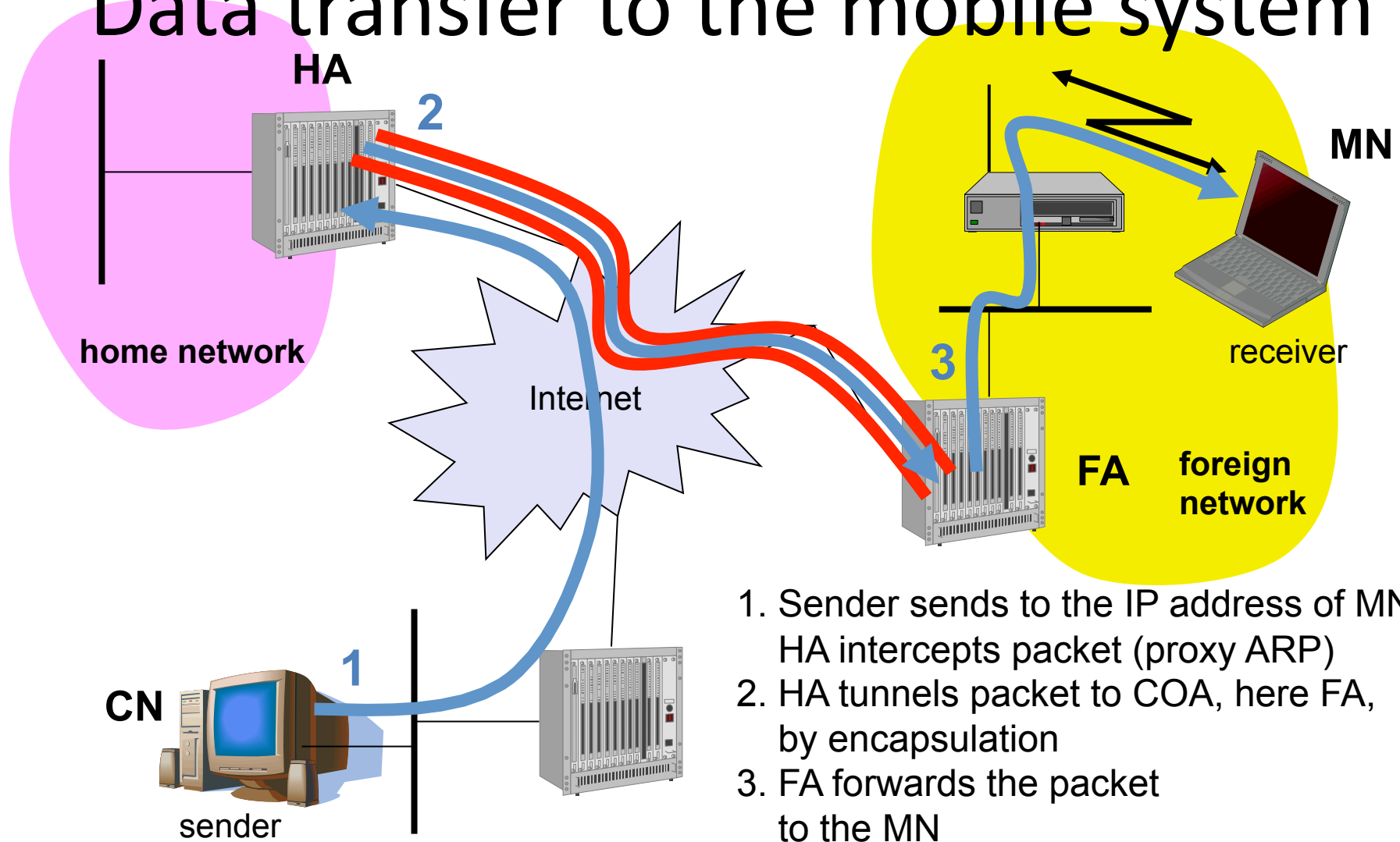


- Mobile Node (MN)
 - system (node) that can change the point of connection to the network without changing its IP address
- Home Agent (HA)
 - system in the home network of the MN, typically a router
 - registers the location of the MN, tunnels IP datagrams to the COA
- Foreign Agent (FA)
 - system in the current foreign network of the MN, typically a router
 - forwards the tunneled datagrams to the MN, typically also the default router for the MN
- Care-of Address (COA)
 - address of the current tunnel end-point for the MN (at FA or MN)
 - actual location of the MN from an IP point of view
 - can be chosen, e.g., via DHCP
- Correspondent Node (CN)
 - communication partner

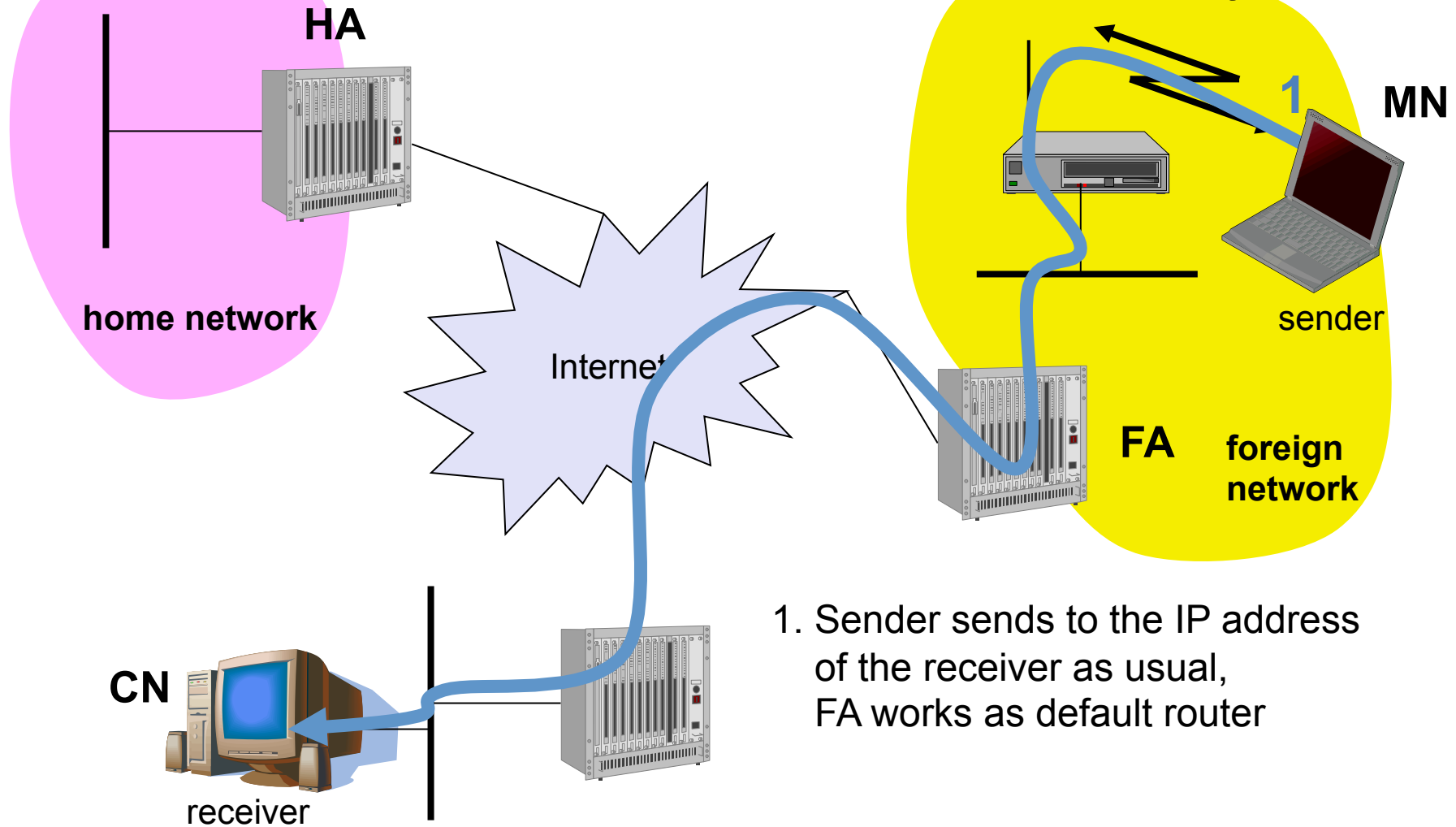
Example network



Data transfer to the mobile system

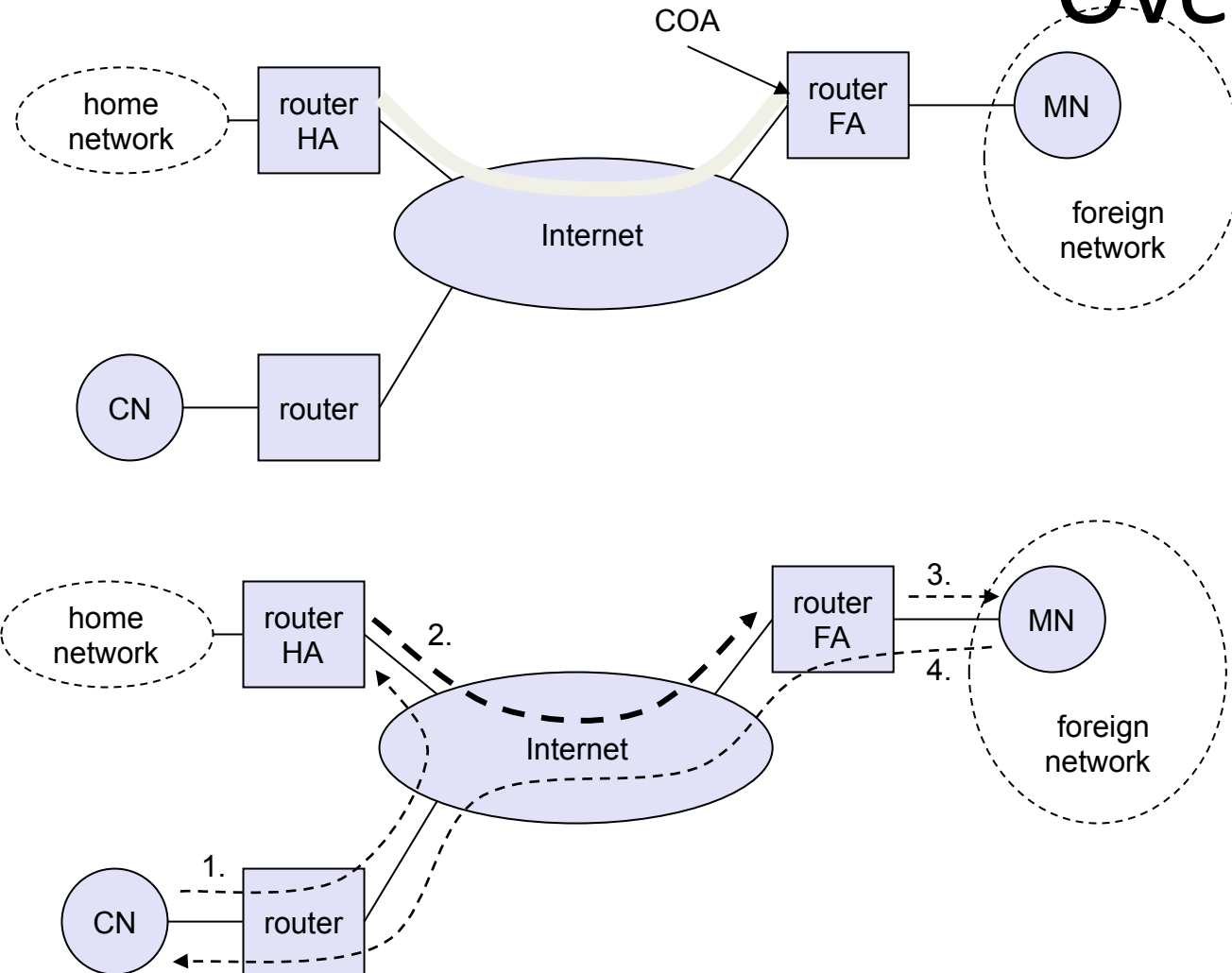


Data transfer from the mobile system



1. Sender sends to the IP address of the receiver as usual, FA works as default router

Overview



Network integration

- Agent Advertisement
 - HA and FA periodically send advertisement messages into their physical subnets
 - MN listens to these messages and detects, if it is in the home or a foreign network (standard case for home network)
 - MN reads a COA from the FA advertisement messages
- Registration (always limited lifetime!)
 - MN signals COA to the HA via the FA, HA acknowledges via FA to MN
 - these actions have to be secured by authentication
- Advertisement
 - HA advertises the IP address of the MN (as for fixed systems), i.e. standard routing information
 - routers adjust their entries, these are stable for a longer time (HA responsible for a MN over a longer period of time)
 - packets to the MN are sent to the HA,
 - independent of changes in COA/FA