

Basic Mobility Concepts

Kimmo Raatikainen
kimmo.raatikainen@cs.helsinki.fi

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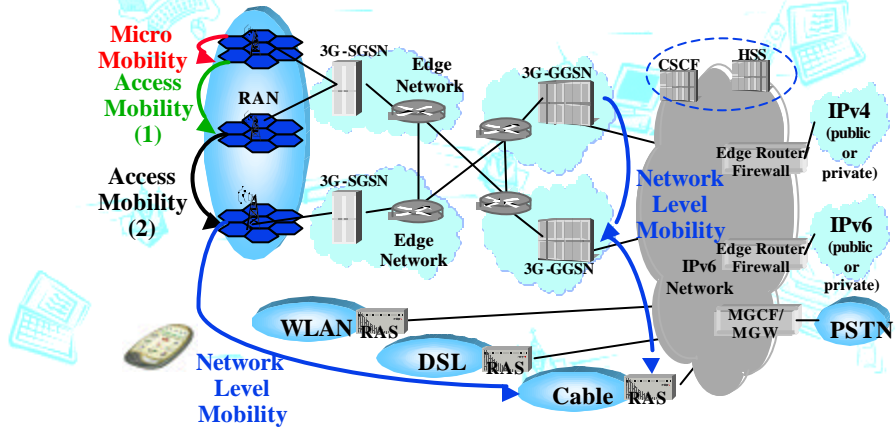
Lesson Outline

- Terminal Mobility
- Personal/User Mobility
- Session Mobility
- Handoff/Hanover
 - Network initiated
 - Terminal initiated
 - Access recovery

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Terminal Mobility

- device changes its point-of-presence in the network



Personal Mobility

- User changes her binding to a service thru a device



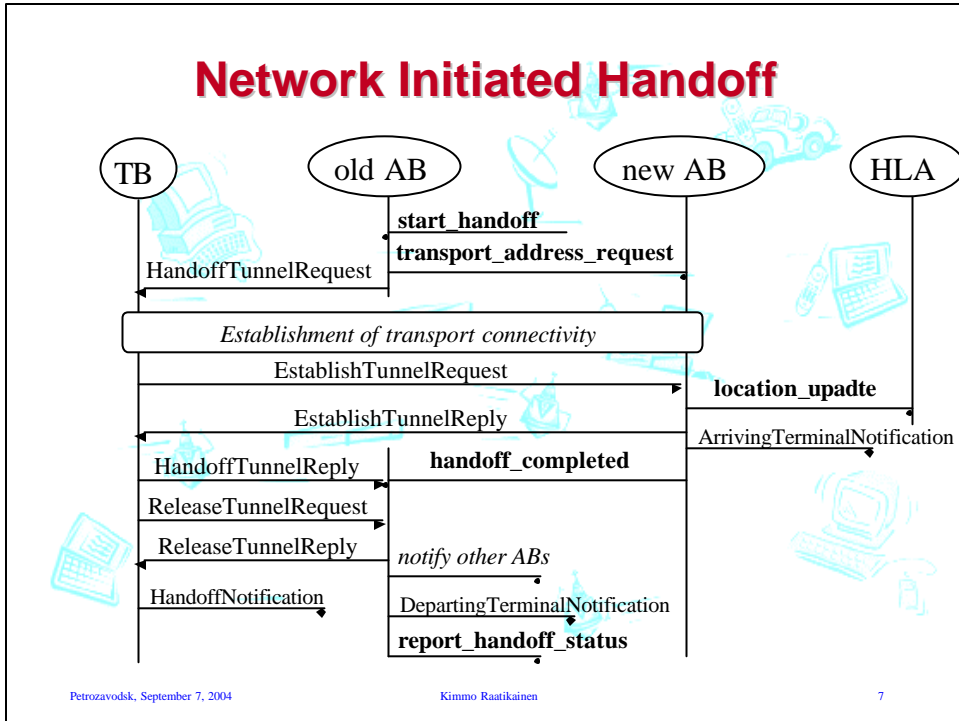
Session Mobility

- dynamic (re)placement of application elements
- example
 - I started to read my email in train using my communicator (pda with wan)
 - When arrived to my office, I continue reading my email using my desktop
 - challenge: move my "email reading state"

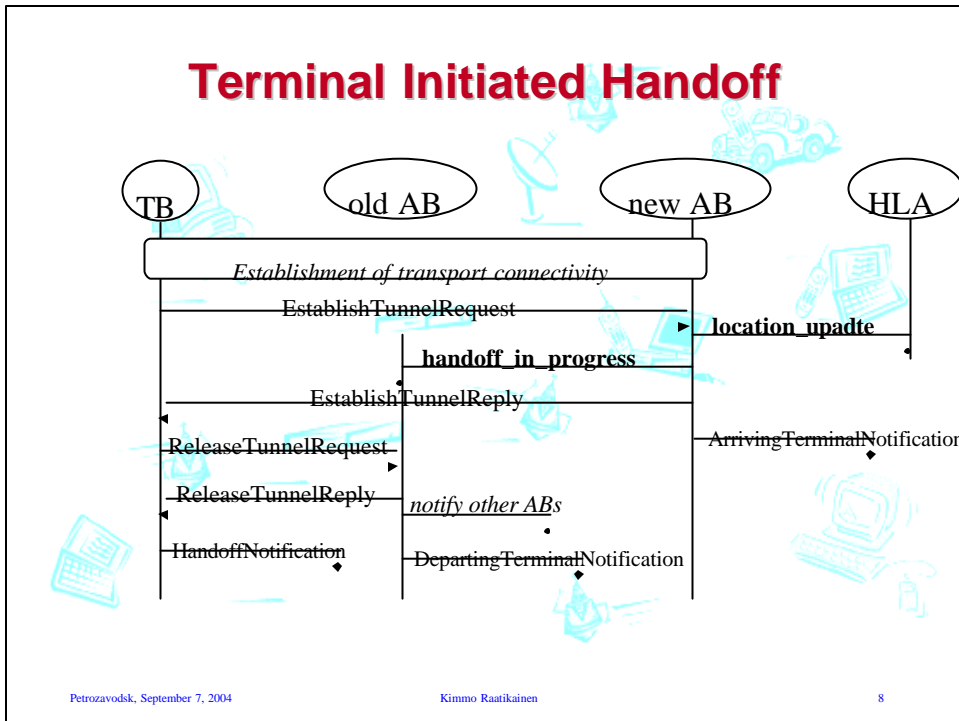
Handover/Handoff

- Network initiated
 - network has detected that a "better" connection is available thru another network interface
- Terminal initiated
 - terminal has detected that it has a "better" connection thru another access point
- Access recovery
 - terminal lost connectivity and re-establishes it

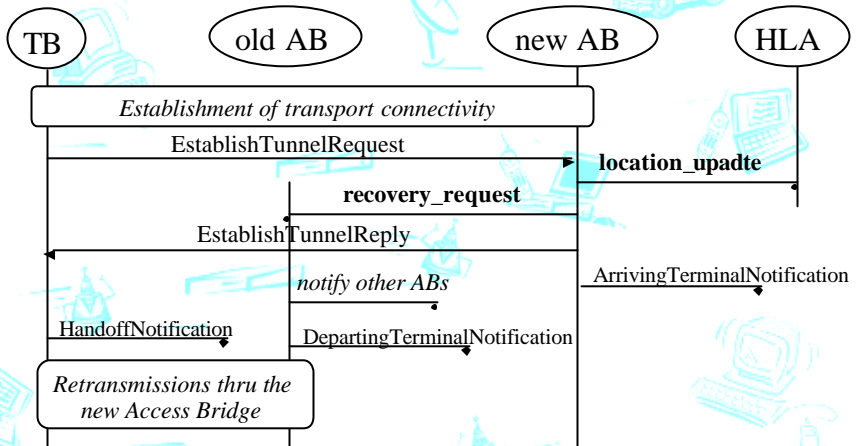
Network Initiated Handoff



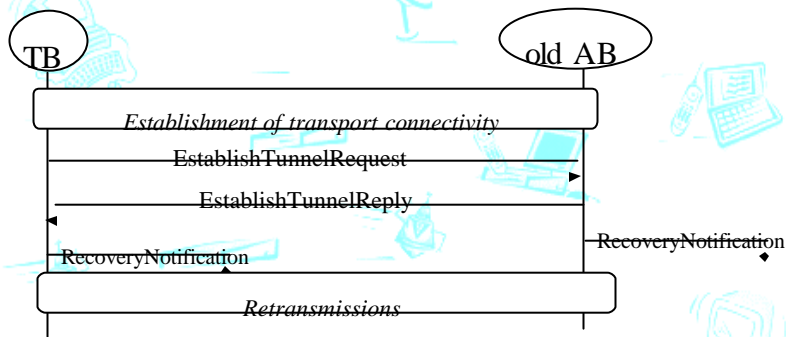
Terminal Initiated Handoff



Access Recovery



Access Recovery



Horizontal Handover

- A handover in which the mobile node's network interface does not change (from the IP point of view)
- the MN communicates with the access network via the same network interface before and after the handover.
- A horizontal handover is typically also an intra-technology handover but it can be an inter-technology handover if the MN can do a layer 2 handover between two different technologies without changing the network interface seen by the IP layer.

Vertical Handover

- In a vertical handover the mobile node's network interface to the Access Network changes.
- A vertical handover is typically an inter-technology handover but it may also be an intra- technology handover if the MN has several network interfaces of the same type.
- After the handover, the IP layer communicates with the Access Network through a different network interface.

Simultaneous Access

- **Make-before-break (MBB)**
 - During a MBB handover the MN can communicate simultaneously with the old and new AR.
 - This should not be confused with "soft handover" which relies on macro diversity.
- **Break-before-make (BBM)**
 - During a BBM handover the MN cannot communicate simultaneously with the old and the new AR.

Handover Performance

- **Smooth handover**
 - A handover that aims primarily to minimize packet loss, with no explicit concern for additional delays in packet forwarding.
- **Fast handover**
 - A handover that aims primarily to minimize delay, with no explicit interest in packet loss.
- **Seamless handover**
 - A handover in which there is no change in service capability, security, or quality.
 - In practice, some degradation in service is to be expected.

Diversity

- Micro diversity
 - for example, two antennas on the same transmitter send the same signal to a receiver over a slightly different path to overcome fading.
- Macro diversity
 - Duplicating or combining actions taking place over multiple APs, possibly attached to different ARs.
 - This may require support from the network layer to move the radio frames between the basestations and a central combining point.
- IP diversity
 - the splitting and combining of packets at the IP level.

Roaming

- An operator-based term involving formal agreements between operators that allows a mobile to get connectivity from a foreign network. Roaming (a particular aspect of user mobility) includes, for example, the functionality by which users can communicate their identity to the local AN so that inter-AN agreements can be activated and service and applications in the MN's home network can be made available to the user locally.

Paging

- **Paging**
 - a procedure initiated by the Access Network to move an Idle MN into the Active State.
 - As a result of paging, the MN establishes a SAR and the IP routes are set up.
- **Location updating**
 - a procedure initiated by the MN, by which it informs the AN that it has moved into a new paging area.

Paging

- **Paging Area**
 - A part of the Access Network, typically containing a number of ARs/APs, which corresponds to some geographical area.
 - The AN keeps and updates a list of all the Idle MNs present in the area.
 - If the MN is within the radio coverage of the area it will be able to receive paging messages sent within that Paging Area.
- **Paging Area Registrations**
 - Signaling from a dormant mode mobile node to the network, by which it establishes its presence in a new paging area.
 - Paging Area Registrations thus enable the network to maintain a rough idea of where the mobile is located.

Paging

- **Paging Channel**

- A radio channel dedicated to signaling dormant mode mobiles for paging purposes.
- By current practice, the protocol used on a paging channel is usually dictated by the radio link protocol, although some paging protocols have provision for carrying arbitrary traffic (and thus could potentially be used to carry IP).

Mobility

- **Macro/Global mobility**

- Mobility over a large area.
- This includes mobility support and associated address registration procedures that are needed when a mobile host moves between IP domains.
- Inter-AN handovers typically involve macro-mobility protocols.
- Mobile-IP can be seen as a means to provide macro mobility.

Mobility

The background of the slide features a light blue network diagram. It consists of several nodes connected by lines. The nodes include a laptop, a satellite dish, a car with a mobile phone antenna, a desktop computer with a monitor and keyboard, and a mobile phone. The overall theme is network connectivity and mobility.

- **Micro/Local mobility**

- Mobility over a small area.
- Usually this means mobility within an IP domain with an emphasis on support for active mode using handover, although it may include idle mode procedures also.
- Micro-mobility protocols exploit the locality of movement by confining movement related changes and signalling to the access network.