



Ecole Nationale
Supérieure des
Télécommunications

Quality of Service Support in NEMO Networks

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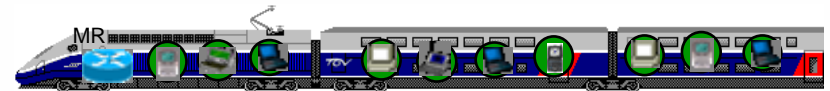
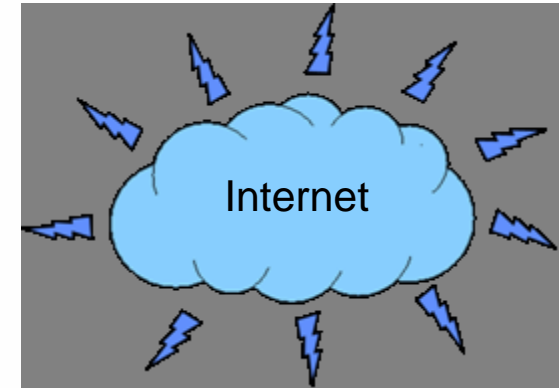
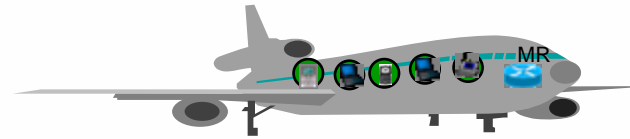
ASWN 2006, Berlin , 29-31 May 2006

Outline

- Introduction
- NEMO and QoS requirements
- Resource reservation procedures
 - NEMOR
- Conclusion and future work

Motivation & Applications

- Explosion of mobile peripherals's market
- LANs and PANs become mobile networks
 - ◆ Mobile vehiculars, network sensors (buses, trains, planes, etc)
 - ◆ Mobile bodies (humans, animals, equipments, etc)
 - ◆ Projects: InternetCAR, InternetITS, Nautilus
- Permanent connexion to a fixed network (Internet)!
- NETwork MObility : NEMO
- IETF
 - ◆ **Host/node mobility**
 - Mipv4, Mipv6 working groups
 - ◆ **Network mobility**
 - nemo
 - ◆ **Manet**



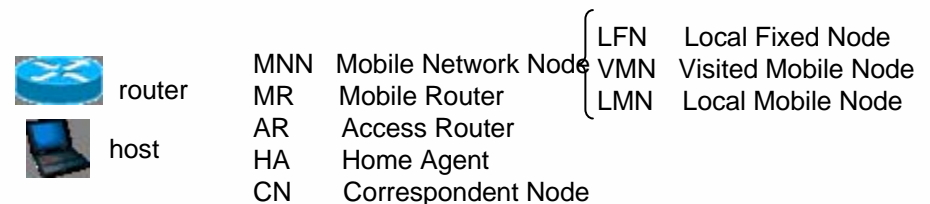
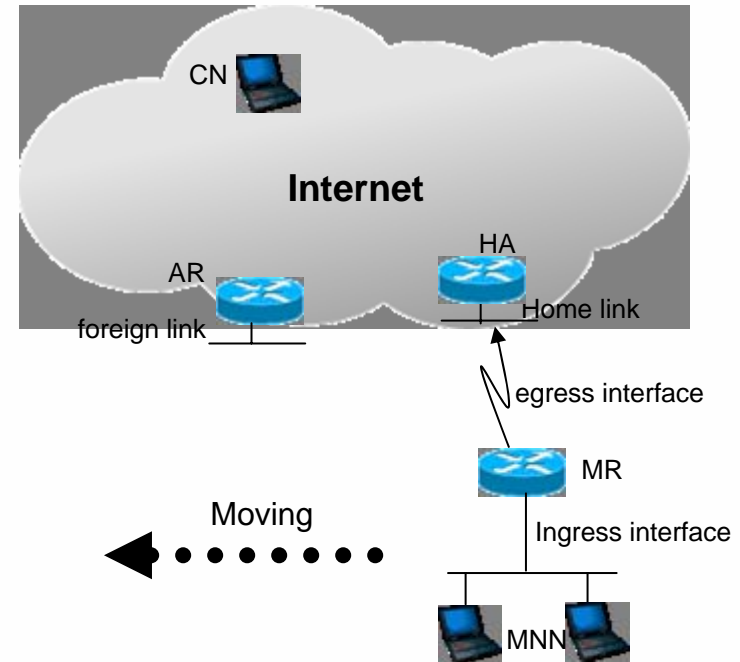
NEMO Architecture

- NEMO

- ◆ A collection of nodes (users)
- ◆ Nodes move together
- ◆ Nodes are connected to the fixed network through mobile routers
- ◆ The network dynamically changes its point of attachment to the Internet

- Several kinds of nodes

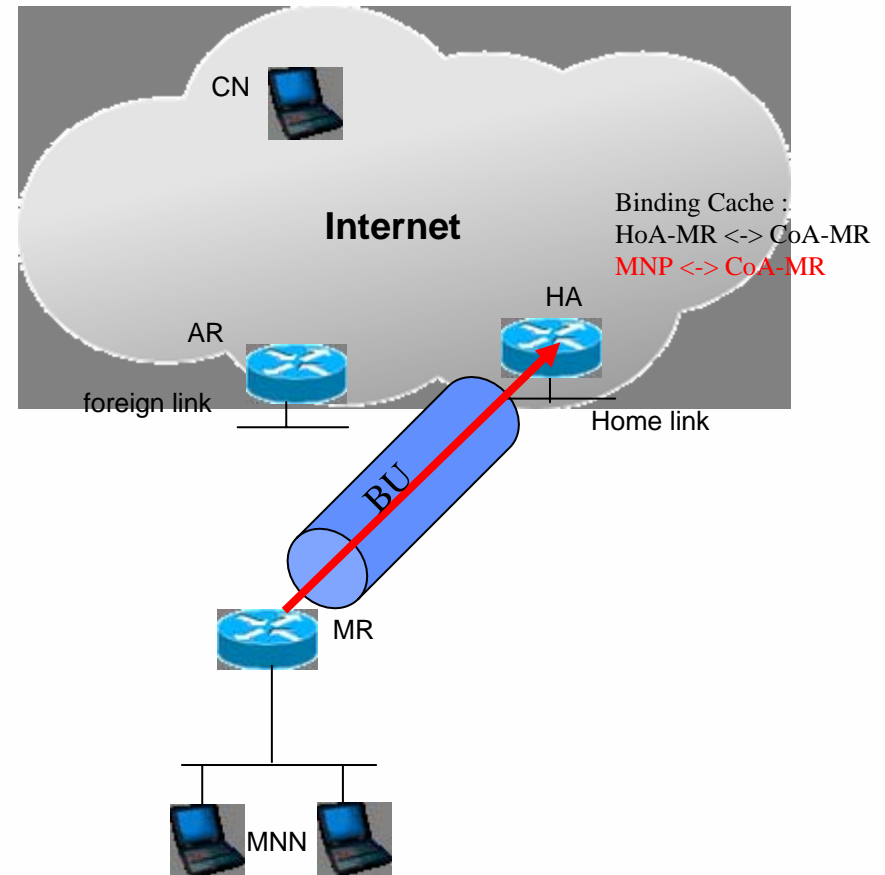
- Dense networks (many hundreds of nodes)



Home link between AR and MR, Home Prefix
 Internal link between MNN and MR, MNP Prefix

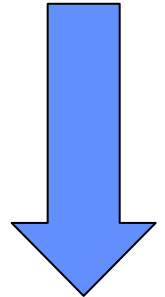
NEMO basic support

- Binding Update : BU
 - ◆ CoA, Care of Address
 - ◆ MNP, Mobile Network Prefix
- Bidirectional tunnel between HA and MR
- All packets (incoming, outgoing) (MNN –CN) have to traverse this tunnel
- Path MR-HA is common for all data traffic, independent of CNs



Motivation - QoS

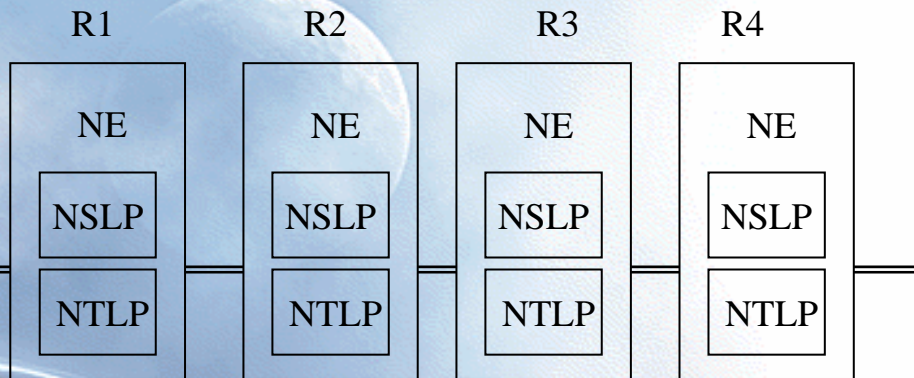
- NEMO networks may support frequent handovers between various ARs
 - ◆ *Resource reservation must be re-established to avoid QoS degradation*
 - ◆ MR has to re-establish the reservation for each MNN on the new path
- Goal: A scalable resource reservation (large number of users+frequent HOs)
 - reduction of signaling overhead
 - Fast end-to-end QoS session establishment
- Intelligent entity capable of
 - Gathering information related to the traffic transmitted by ARs
 - Managing many ARs
- A reservation protocol that exploits the characteristics of NEMO networks
 - ◆ QoS guarantee for applications (IntServ approach)
 - ◆ Aggregation need (DiffServ approach)



NEMOR
(NEMO Reservation)

NEMOR Protocol

- Signaling protocol
 - IETF NSIS : *Next Step In Signaling* working group
 - A new generic protocol to support various signaling applications



NSLP: NSIS Signaling Layer Protocol
NTLP: NSIS Transport Layer Protocol
R_i: intermediate router
NE: NSIS Entity

- NTLP
 - Transport signaling messages + signaling state management between adjacent nodes
 - Independent of any signaling application
- NSLP
 - Functions specific to a particular application (message formats, ...)

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- NTLP supports RSVP signaling to reserve resources to aggregated flows
 - NSLP distinguishes between different aggregated flows
 - Diffserv-NSLP
 - RSVP-NSLP
 - Many situations
 - ◆ Handoff
 - A home network moves
 - Re-establishment of the aggregated reservation between MR and ARC only !
 - ◆ Arrival of new mobile nodes
 - MNN joins a new NEMO network
 - Release reservation in the old mobile network
 - MR sends a reservation message towards the ARC
 - ARC forwards the message to CN
 - Reservation set up in the visited network
 - ◆ Traffic variations

Resource reservation procedures

- **MR-ARC resource reservation**

- ◆ Common for all MNs in the NEMO network
- ◆ MR sends a RRRM message
- ◆ This message must be processed in each intermediary router along the path to ARC
- ◆ ARC sends a response message to MR, MR can adapt according to the available resources

- **ARC-CN resource reservation**

- ◆ ARC launches resource reservation for each CN

Resource reservation during HO

