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# QoS Provision On IP Access Networks Using IPv6

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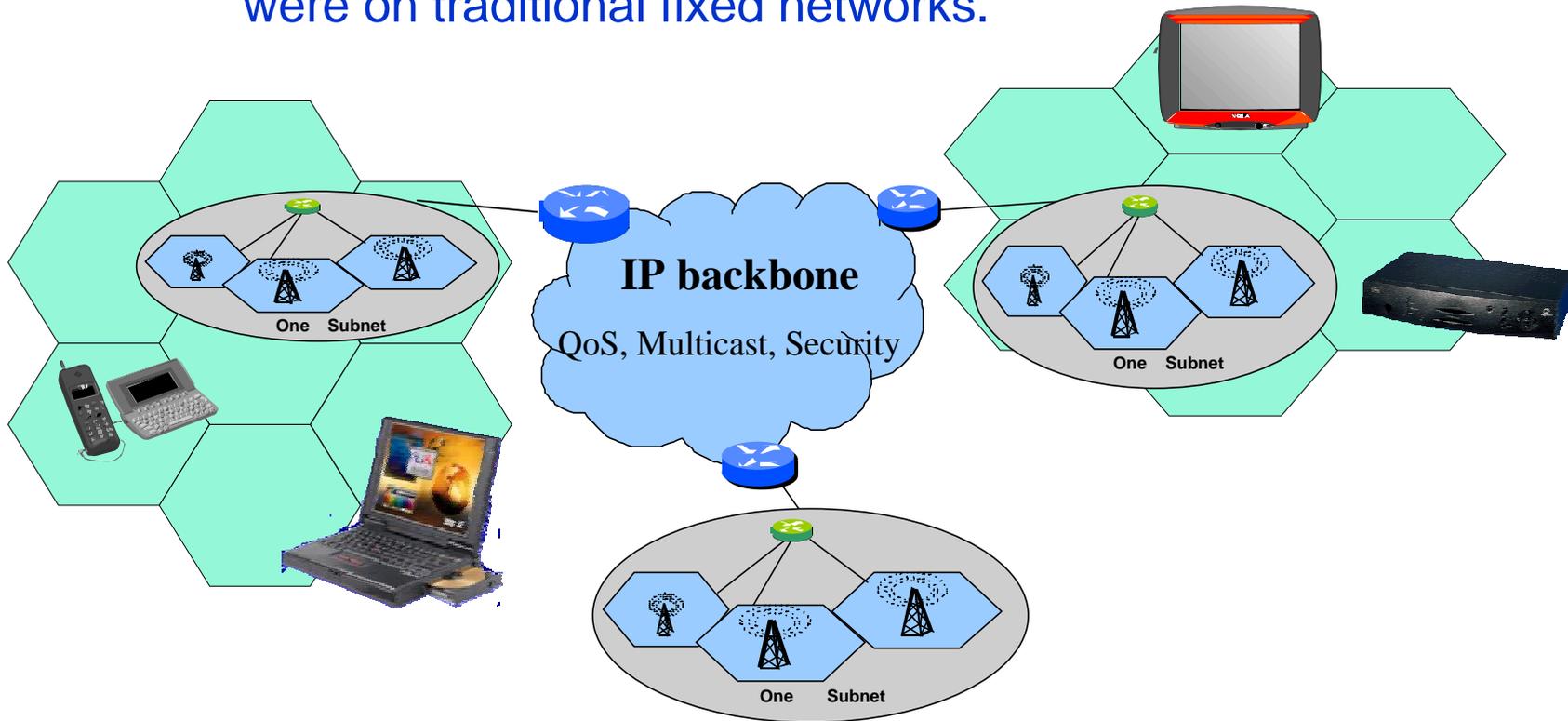
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# The Facts

- ◆ There's a tendency towards all-IP networks:
  - ▶ Fast adoption of IP-based communications for hand-held wireless interfaces.
  - ▶ Users expect access to advanced internet services as if they were on traditional fixed networks.



# The mobility problem

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## ◆ Purposes from the QoS point of view:

- ▶ Providing the requested service even if the terminal changes its point of attachment to the network.
- ▶ Deal with handovers, change of IP addresses, inter-domain mobility, etc.

## ◆ Mobile IP problems:

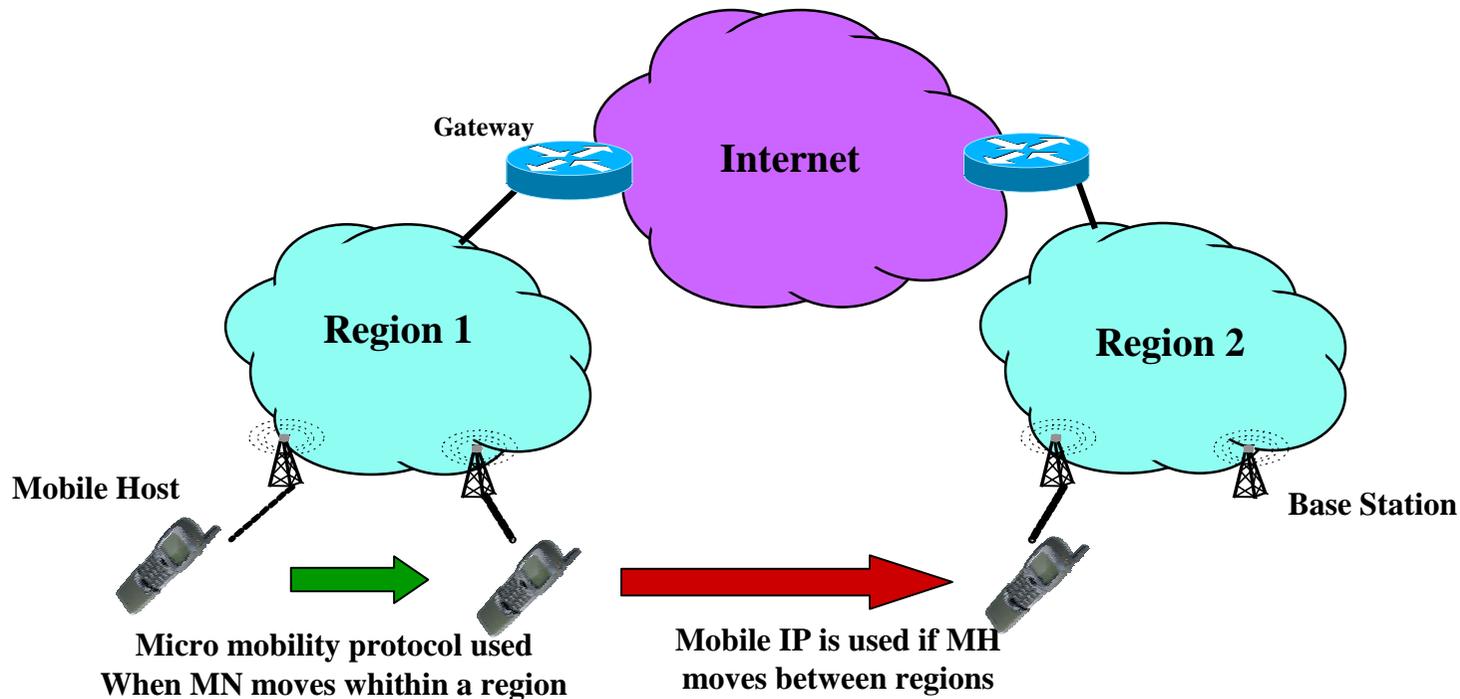
- ▶ Triangular routing-problem, packets go up and down-stream through different paths.
- ▶ Frequently path updates: high overhead, high latency, high loss.
- ▶ Need of CCOA addresses per host.
- ▶ Use of tunnels which affects QoS provision.

## ◆ Mobile IPv6:

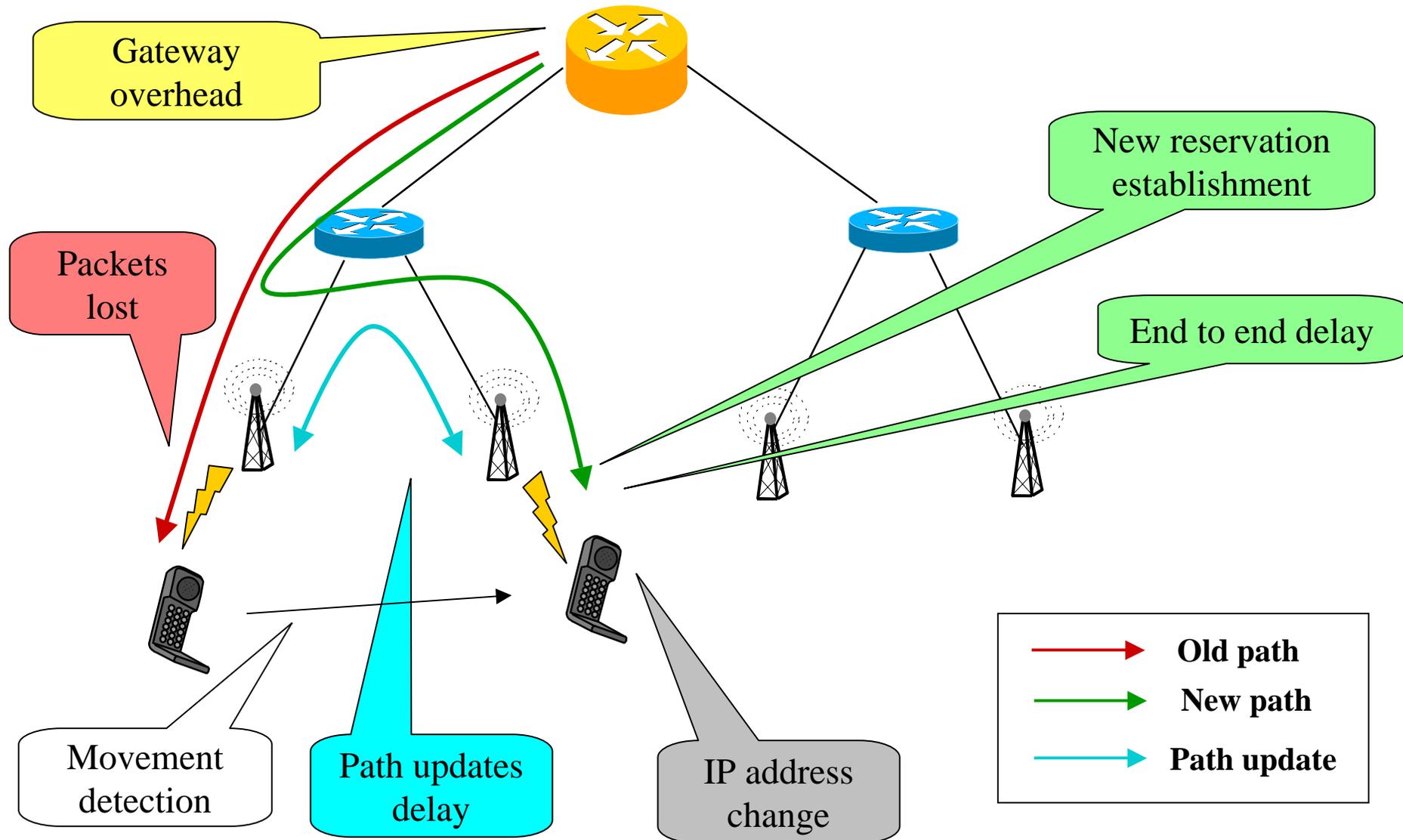
- ▶ Solves most of the problems of Mobile IP.
- ▶ No seamless mobility, frequent path updates which still causes high overhead, latency and loss during handover.

# Micro Mobility

- ◆ Micro-mobility, domain-mobility, Regional-mobility???
  - ▶ It manages movement within the same administrative domain.
- ◆ Advantages of using mm with MobileIP:
  - ▶ Path updates within domain → micro mobility protocol..
  - ▶ Reduces Mobile IP path updates.
  - ▶ Inter-domain handovers are faster.



# Effects of micro-mobility in QoS

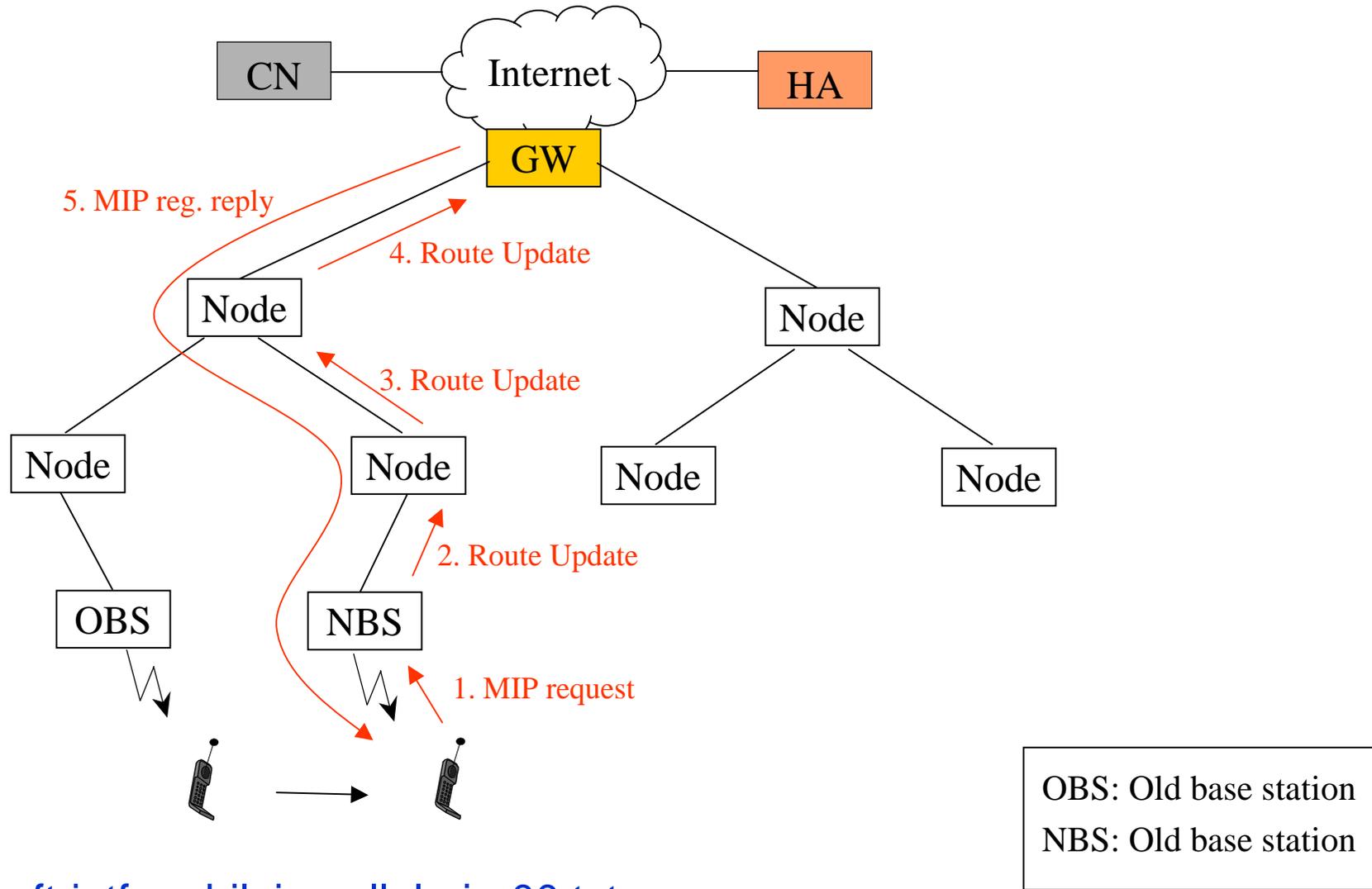


# Using IPv6 for micro-mobility

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- ◆ IPv6 advantages.
  - ▶ Micro-mobility protocols can make use of most of the advantages of IPv6.
  
- ◆ Using IPv6 within the micro-mobility domain:
  - ▶ Use of extension headers.
  - ▶ Security.
  - ▶ Auto-configuration.
  - ▶ Address management.
  - ▶ Tunneling with source address options.
  - ▶ Movement detection.
  - ▶ No tunneling → avoid encapsulation.
  - ▶ QoS extensions (not of use of mm protocol but useful for this discussion).

# Cellular IP



<draft-ietf-mobileip-cellularip-00.txt>

# IPv6 applied to Cellular IP

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- ◆ Changes introduced by using IPv6 on Cellular IP:
  - ▶ Route update packets are included on a IPv6 control header. Route caches are updated with every packet.
  - ▶ Security added for authentication.
  - ▶ Autoconfiguration to obtain COA directly.
  - ▶ No additional IP addresses are introduced. Only IPv6 addressing mechanisms are used.
  - ▶ Route optimization included for IPv6.
  
- ◆ QoS aspects:
  - ▶ The same given by using IPv6: performance, flowid, DSCP.
  - ▶ Given by performance improvements on mobility itself.
  
- ◆ Cellular IPv6:
  - ▶ <draft-shelby-seamoby-cellularipv6-00.txt>.

# So ...

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- ◆ Mobile IP provides basic mobility.
- ◆ Mobile IP has been greatly improved with IPv6 (MIPv6).
- ◆ Micro-mobility protocols optimize mobility.
  - ▶ Most of them do not make use of IPv6.

**“IPv6 can be successfully applied to existing micro-mobility protocols to improve their operation.”**

# But ...

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- ◆ That's not enough for QoS.
- ◆ Things needed for our QoS purposes:
  - ▶ Fast handover → IETF mobileIP group, IETF seamoby group.
  - ▶ minimum packet loss → soft handover.
  - ▶ Bounded impact on delay → micro-mobility approaches?
  - ▶ Uniform level of service (end to end) → within the same cell → standarized support from the link layer so adaptation can be possible.
- ◆ QoS service is a contract that the system need to predict, and that's not possible now.

**“There’s still a lot of things to do to provide ‘good’ QoS when the terminal is moving”**