Network Localized Mobility Management using DHCP

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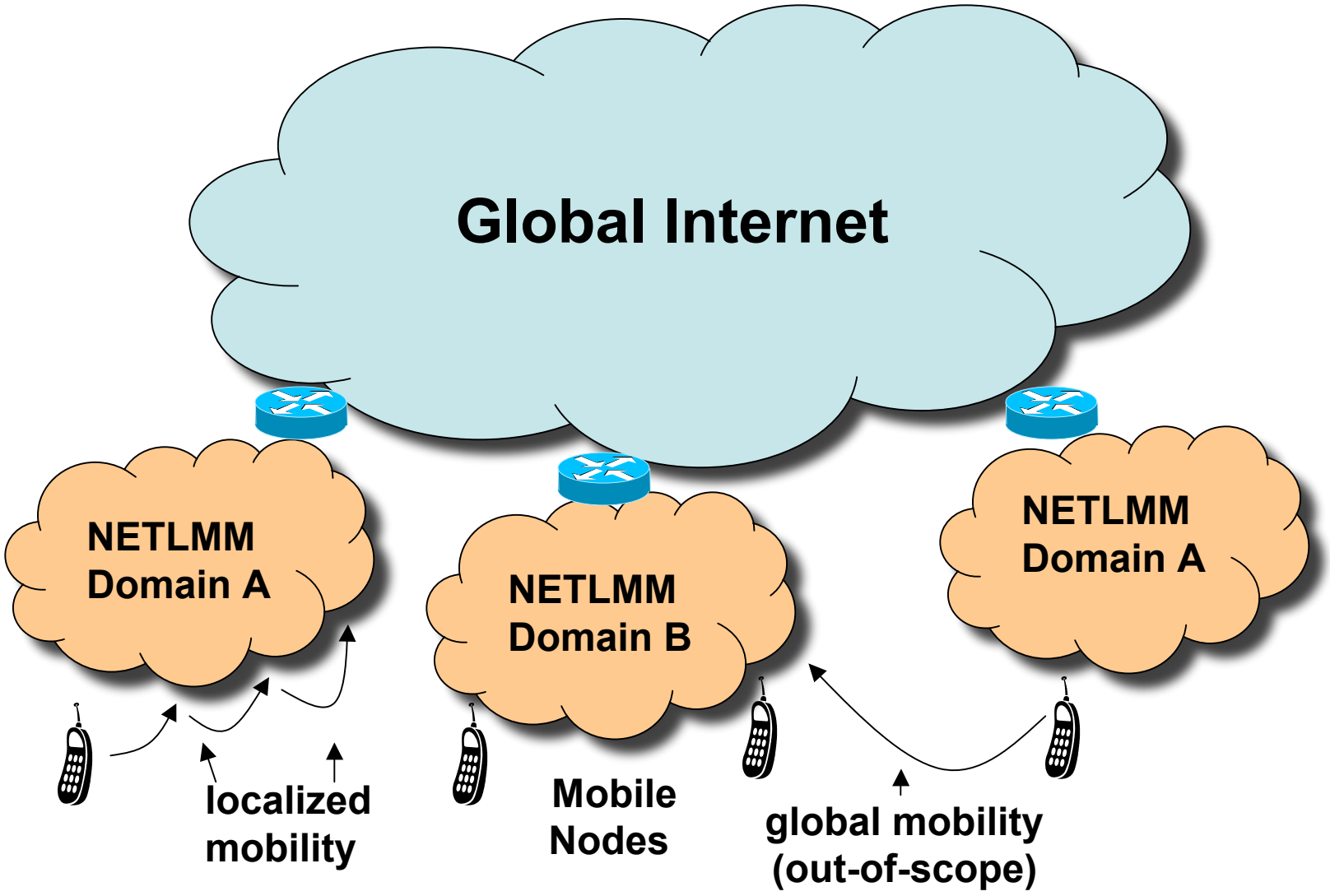
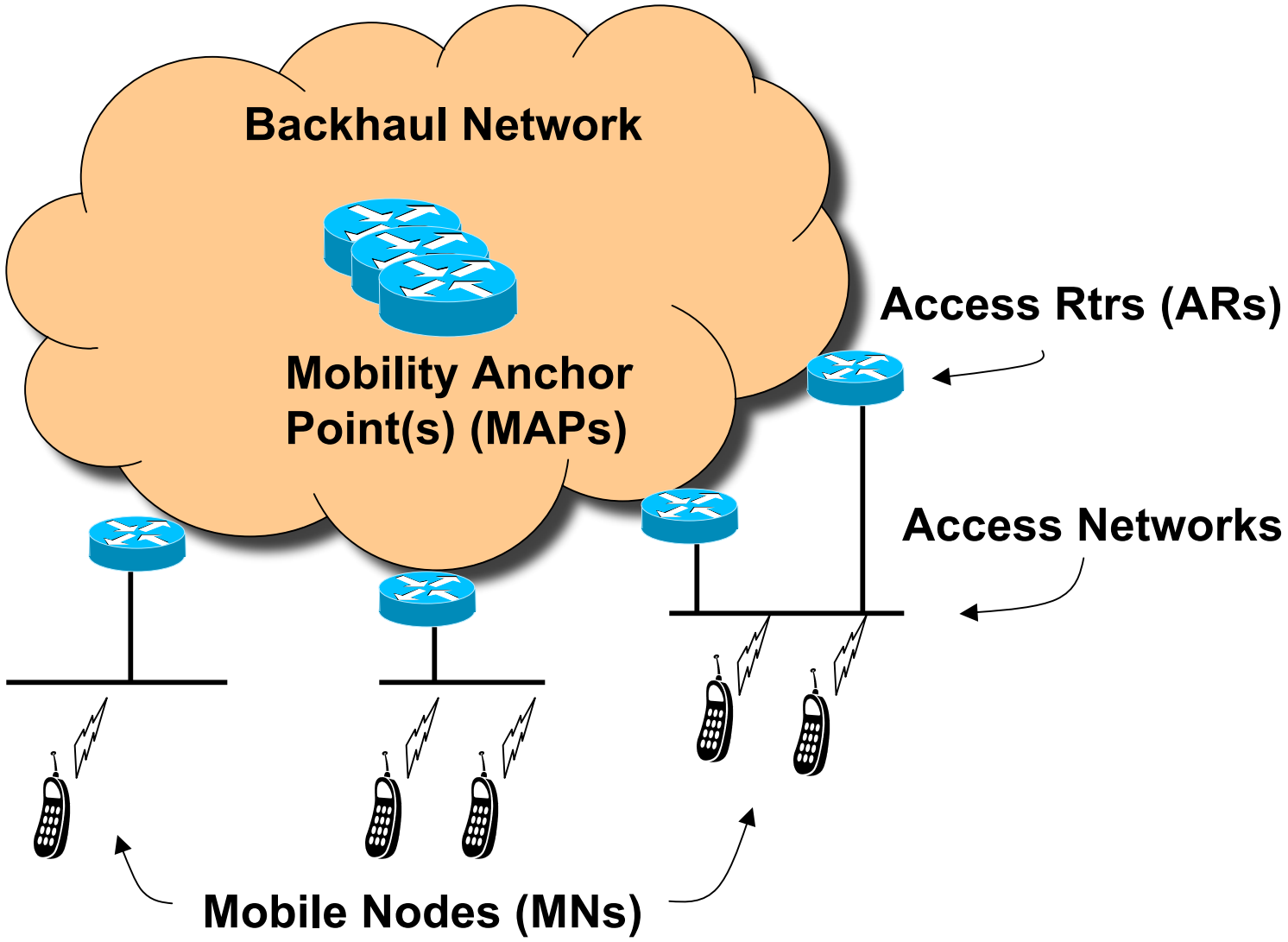
NETLMM Problem Space



NETLMM Goals

- support NETLMM domains as small as a home network or as large a major operator network, e.g., metropolitan region WiFi
- MNs keep same addresses/prefixes as they move within a NETLMM domain (global mobility out-of-scope)
- support session continuity across mobility events
- avoid routing churn by having Mobility Anchor Points that aggregate the NETLMM domain (as opposed to tracking node mobility via a routing protocol)

NETLMM Domain



NETLMM Using DHCP

- Let each MN be a DHCP client
- Let each AR be a DHCP Relay
- Let each MAP be associated with a DHCP server (no need for them to be co-located)

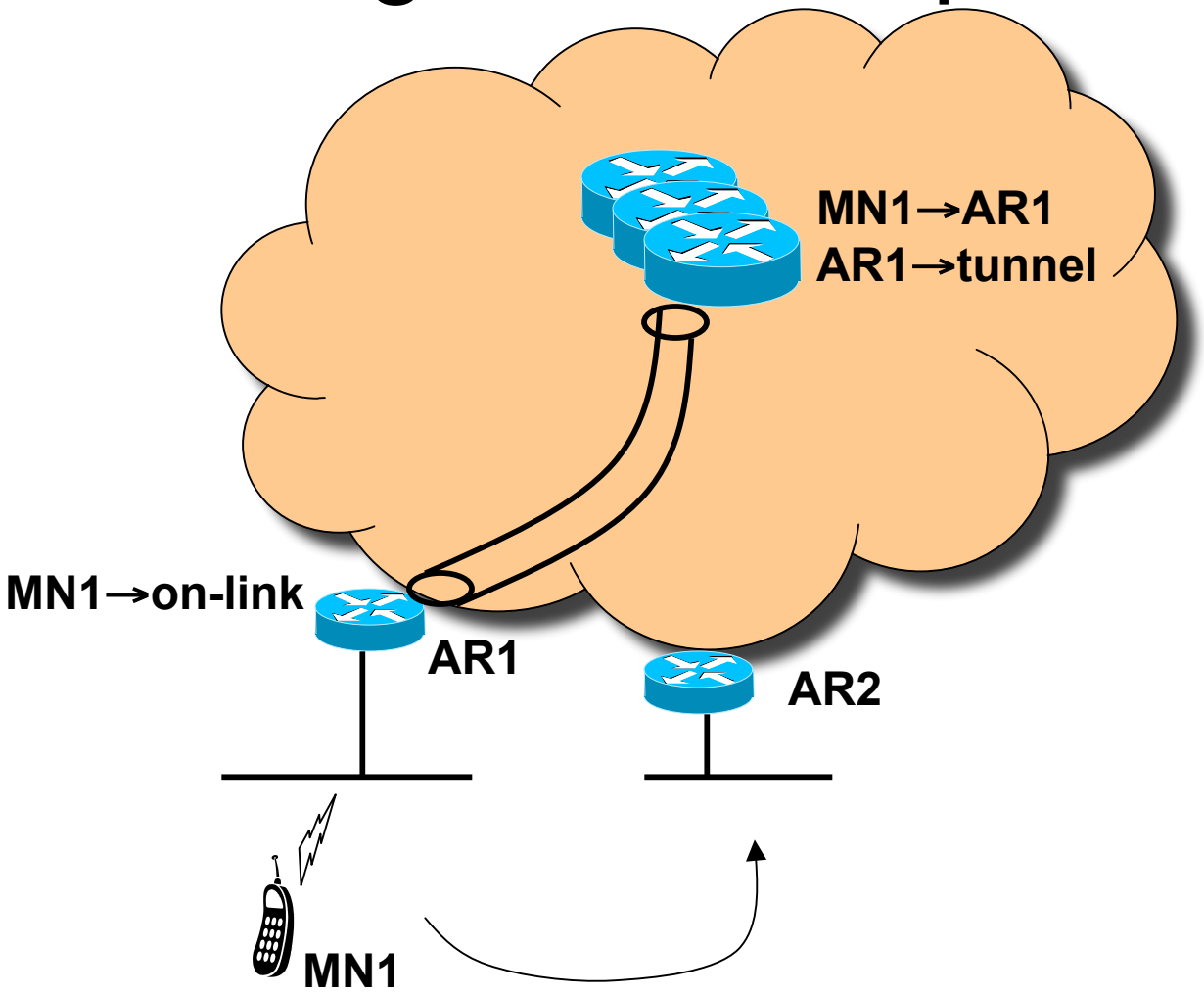
Model of Operation

- MN discovers ARs via RFC2461 Router Advertisements (RAs)
- If RAs contain prefix options, MN can configure addresses using RFC2462, then “register” them with the network by sending DHCP Solicit/Request with IP address options
- If RAs contain no prefix options, or if prefix delegation is desired, MN requests prefixes by sending DHCP Solicit/Request per RFC3633
- AR relays DHCP Solicit/Request to a DHCP server associated with a MAP

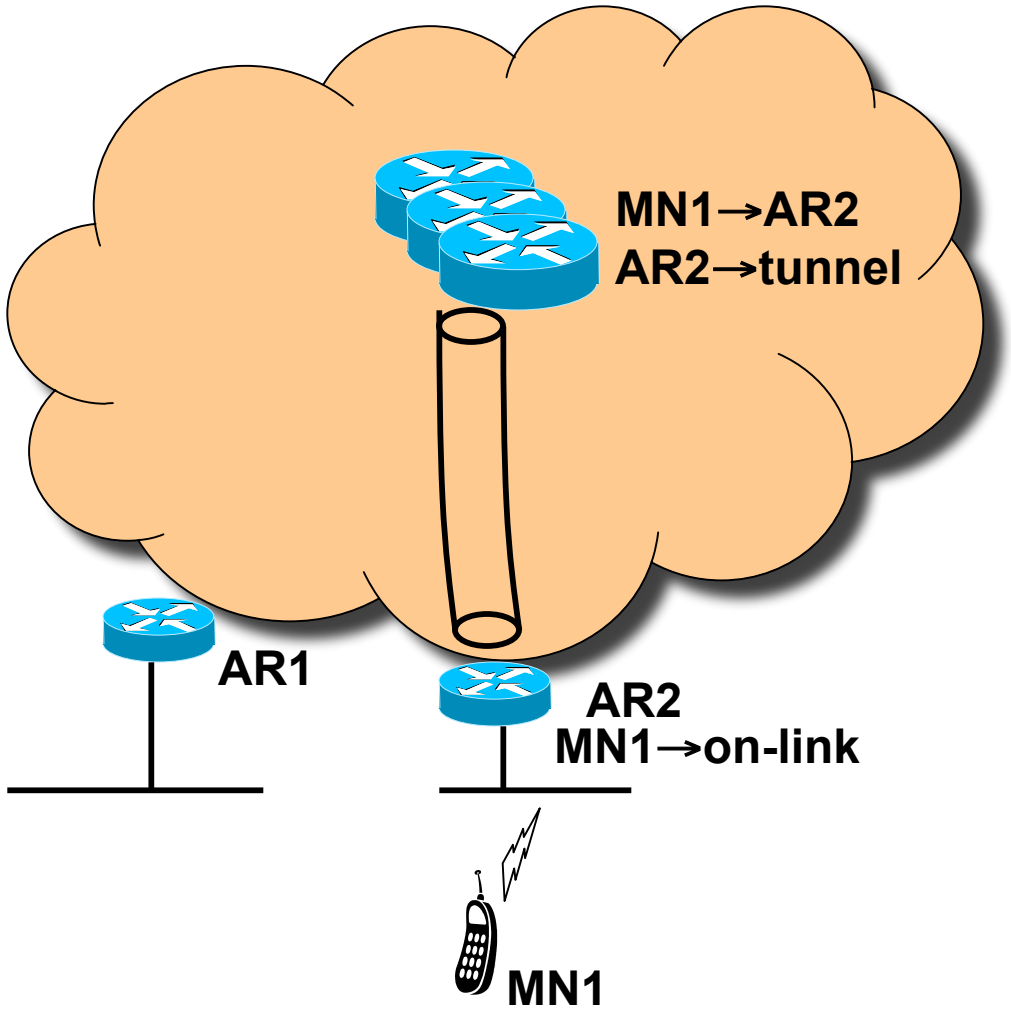
Model of Operation (cont'd)

- DHCP server registers addresses/prefixes, then issues "create tunnel"; "route add" to update MAP IP forwarding table(s)
- DHCP server sends reply to MN which is intercepted by AR; AR performs a local "route add"
- Now, traffic from the Internet destined to MN flows through the MAP(s) and is directed to the correct AR
- If MN moves to a new AR, MN issues a DHCP Confirm which causes the MAPs and ARs to update their IP forwarding tables

Route/Tunnel Configuration after MN config's address/prefix via AR1



Route/Tunnel Configuration After MN moves to AR2



Additional Considerations

- Works with IPv4 as well as IPv6 (IPv6 has some advantages)
- Supports DHCPv6 prefix delegation (delegated prefixes move along with the MN)
- tunnels from MAPs to ARs can be unidirectional
- Explicit messaging between MAPs and ARs might be better than implicit route add/delete based on DHCP messages – being worked in IETF NETLMM wg

Additional Considerations (cont'd)

- With multiple ARs on the link, ambiguous as to which AR is selected in MAP forwarding tables – MN can assert AR selection by sending L3 multicast DHCP Solicit/Request to unicast L2 address of a specific AR
- global addressing goes through MAPs, but efficient local communications can be supported using IPv6 ULAs (could result in dropped calls)
- Since MNs can move freely between access networks, Redirects could cause dropped calls. ARs on NETLMM links should therefore not send redirects.

Issues

- can DHCP Confirm be used to test whether a delegated prefix is appropriate for the new link. If not, why not?
- with all global addresses/prefixes delegated by DHCP server, no need for DAD on NETLMM links?
- link-local addresses can also be registered with DHCP server. Again, no need for DAD?