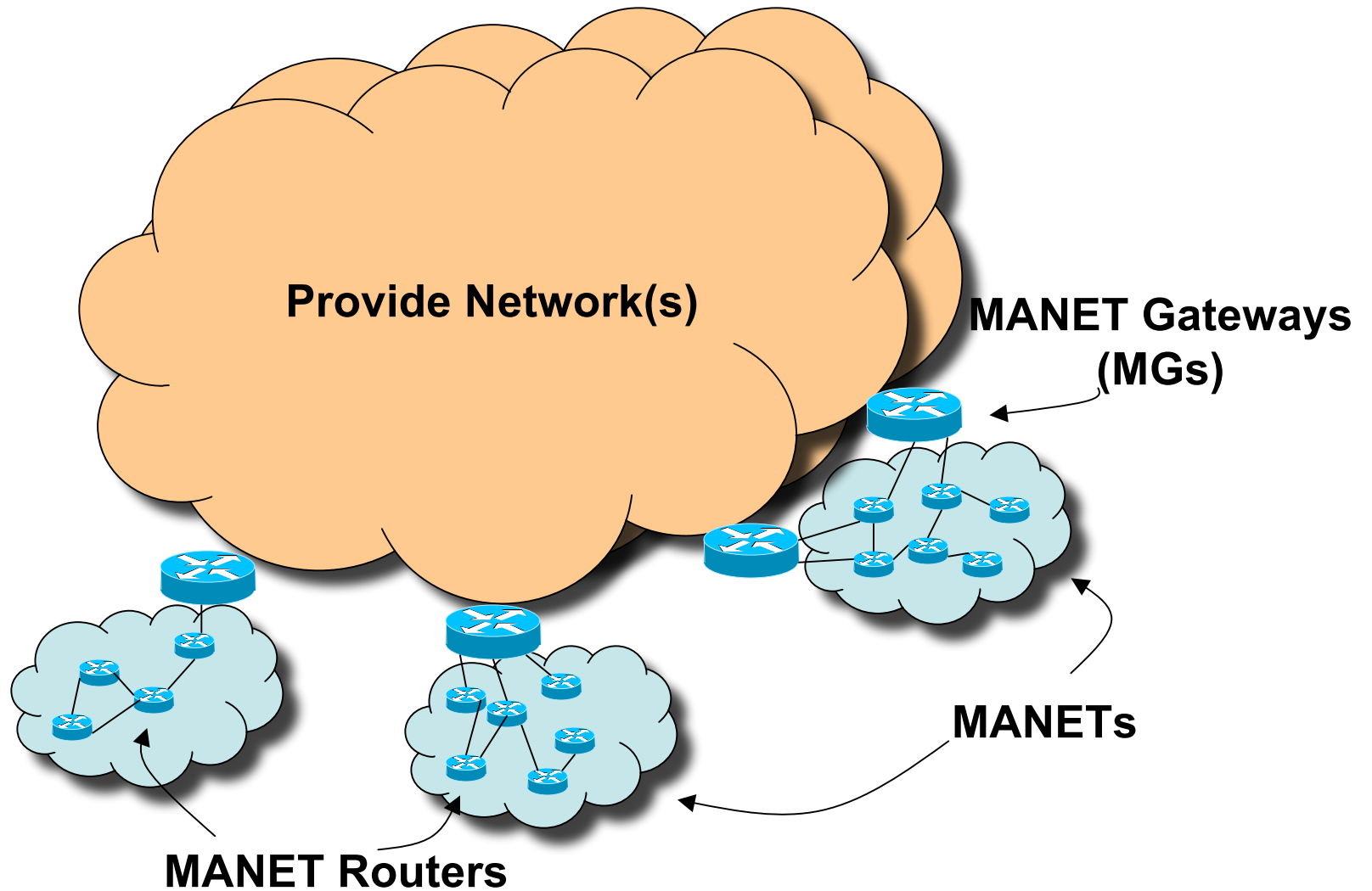


# MANET Autoconfiguration using DHCP

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# MANET Autoconf Problem Space



# MANET Routing Alternatives

- MANET routing as a L2 mechanism w/no L2 multicast flooding – MANET looks like an NBMA link that connects routers/gateways (no gateway discovery; not considered further)
- MANET routing as a L2 mechanism w/L2 multicast flooding - MANET looks like a bridged campus LAN (no special MANET Autoconf extensions needed)
- MANET routing as a L3 mechanism w/no L3 multicast flooding – MANET looks like multiple links w/no multicast (no gateway discovery; not considered further)
- MANET routing as a L3 mechanism w/L3 multicast flooding – MANET looks like multiple links w/MANET-wide (site-scoped) multicast (subject of this proposal)

# MANET Autoconf Goals

- MANET Routers (MRs) must be able to discover MANET Gateways (MGs) even if they are multiple L3 hops away
- MRs must be able to obtain global IP address/prefix delegations
- support for multiple MGs
- support for intra- and inter-MANET mobility for MRs
- Support for both IPv6 and IPv4

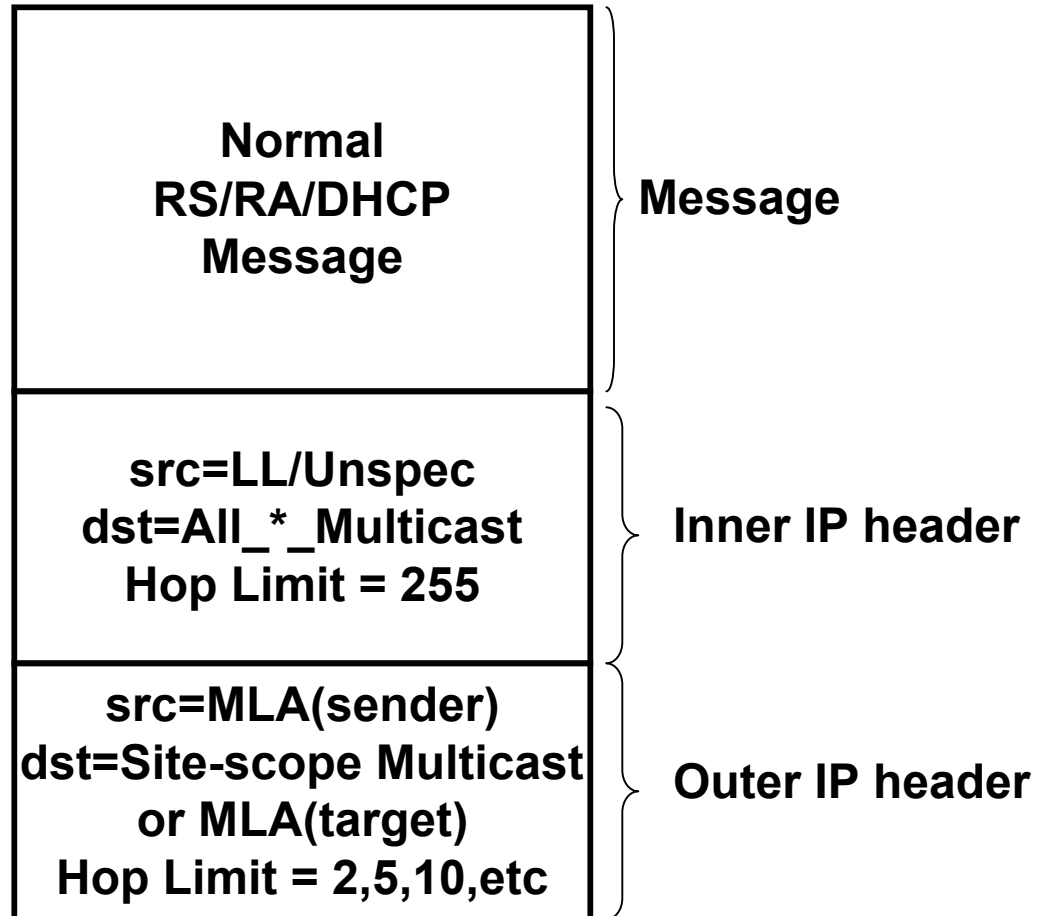
# MANET Autoconf Using DHCP

- Let each MR and MG configure a MANET Local Address (MLA) for routing protocol operation; local communications (for IPv6, likely to be RFC4193 ULAs)
- Let each MR be a DHCP client
- Let each MG be a DHCP Relay/Server
- Let there be a means for MRs and MGs to send “Extended” RS, RA and DHCP messages

# Extended RS, RA and DHCP Msgs

- normal RS/RA/DHCP message configured per RFC2461, RFC3315, RFC3633
- message encapsulated in outer IP header with:
  - src = MLA of sender
  - dst = Site-scoped multicast, or MLA of target
  - Hop Limit = small integer value (e.g., 2, 5, 10)
- message “tunneled” to one or more recipients

# Extended RS, RA and DHCP Msgs



# Model of Operation

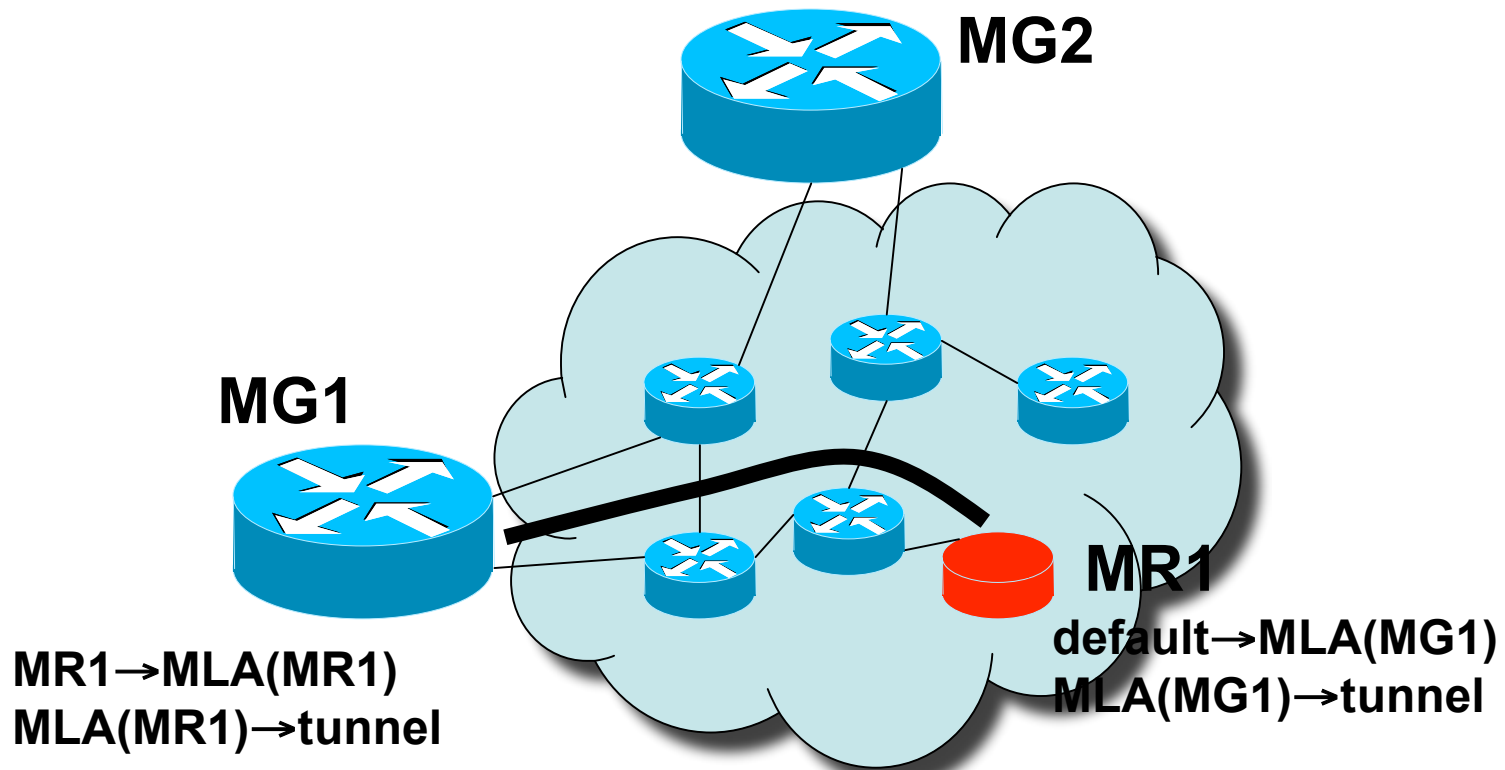
- MR discovers MGs via Extended RAs (ERAs) (MR sends ERSs if necessary)
- If ERAs contain prefix options, MR can configure addresses using RFC2462, then “register” them with the network by sending Extended DHCP Solicit/Request with IP address options
- If ERAs contain no prefix options, or if prefix delegation is desired, MR requests prefixes by sending Extended DHCP Solicit/Request per RFC3633
- MG decapsulates the Extended DHCP Solicit/Request and relays it to a local DHCP server or a server in the provider network



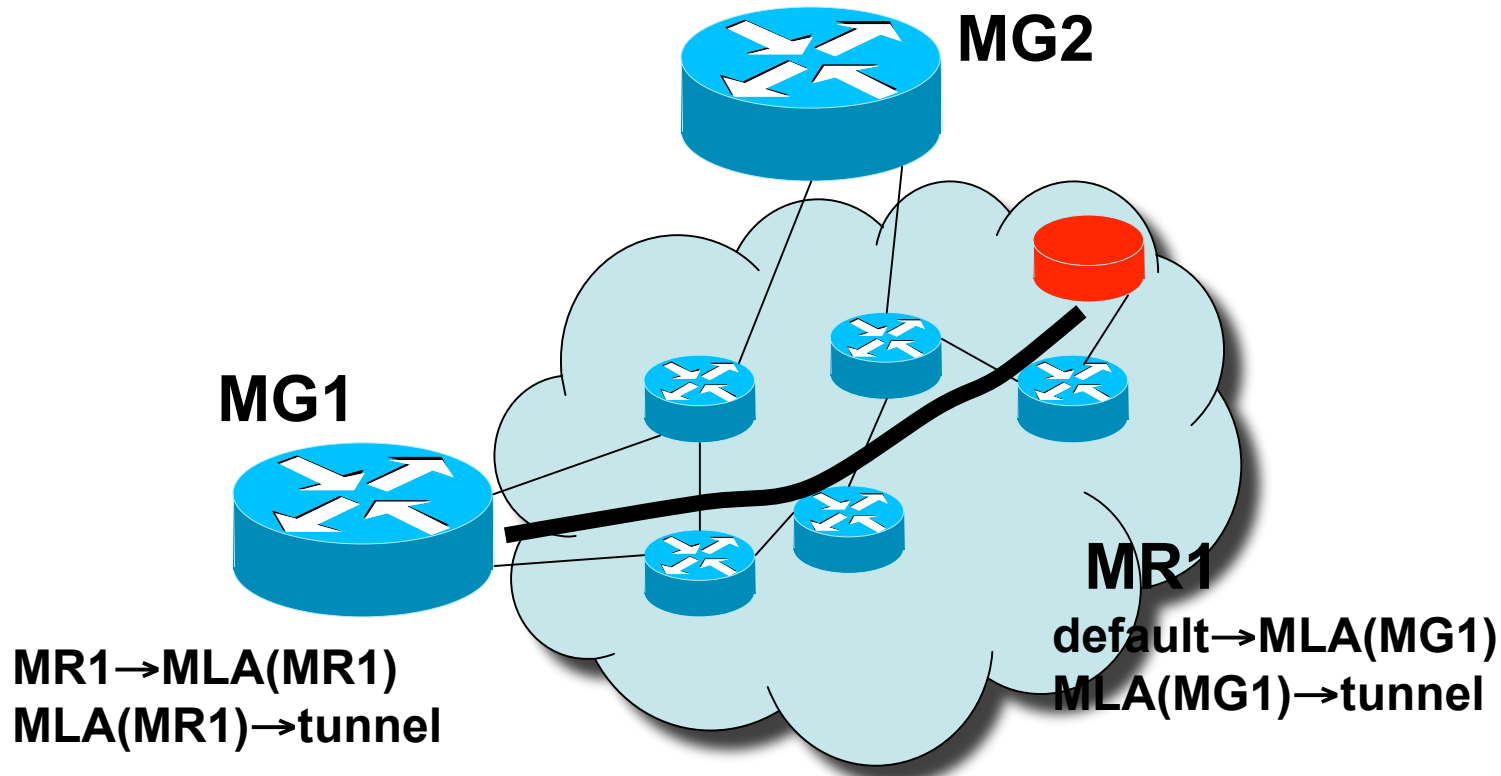
# Model of Operation (cont'd)

- DHCP server sends reply to MR which is intercepted by MG; MG performs a “route add” and “create tunnel” for MR
- MR receives the DHCP reply and performs a “route add” and “create tunnel” for MG
- Now, packets from the Internet destined to MR are directed to MG which tunnels them to MR, and packets from MR destined to the Internet are tunneled to MG
- If MR moves to new MG, it sends an Extended DHCP Confirm which causes MGs to update their IP forwarding tables

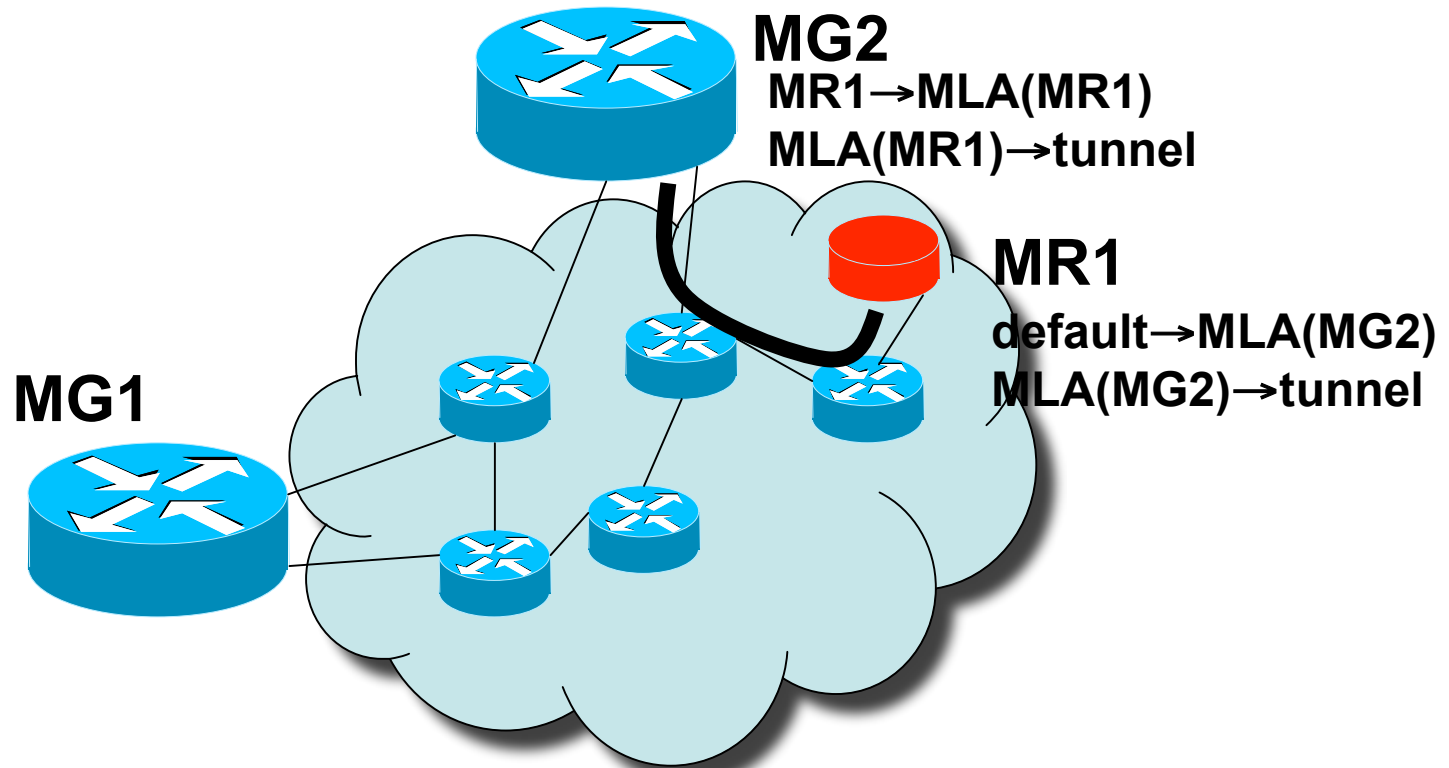
# Route/Tunnel Configuration after MR1 conf's address/prefix via MG1



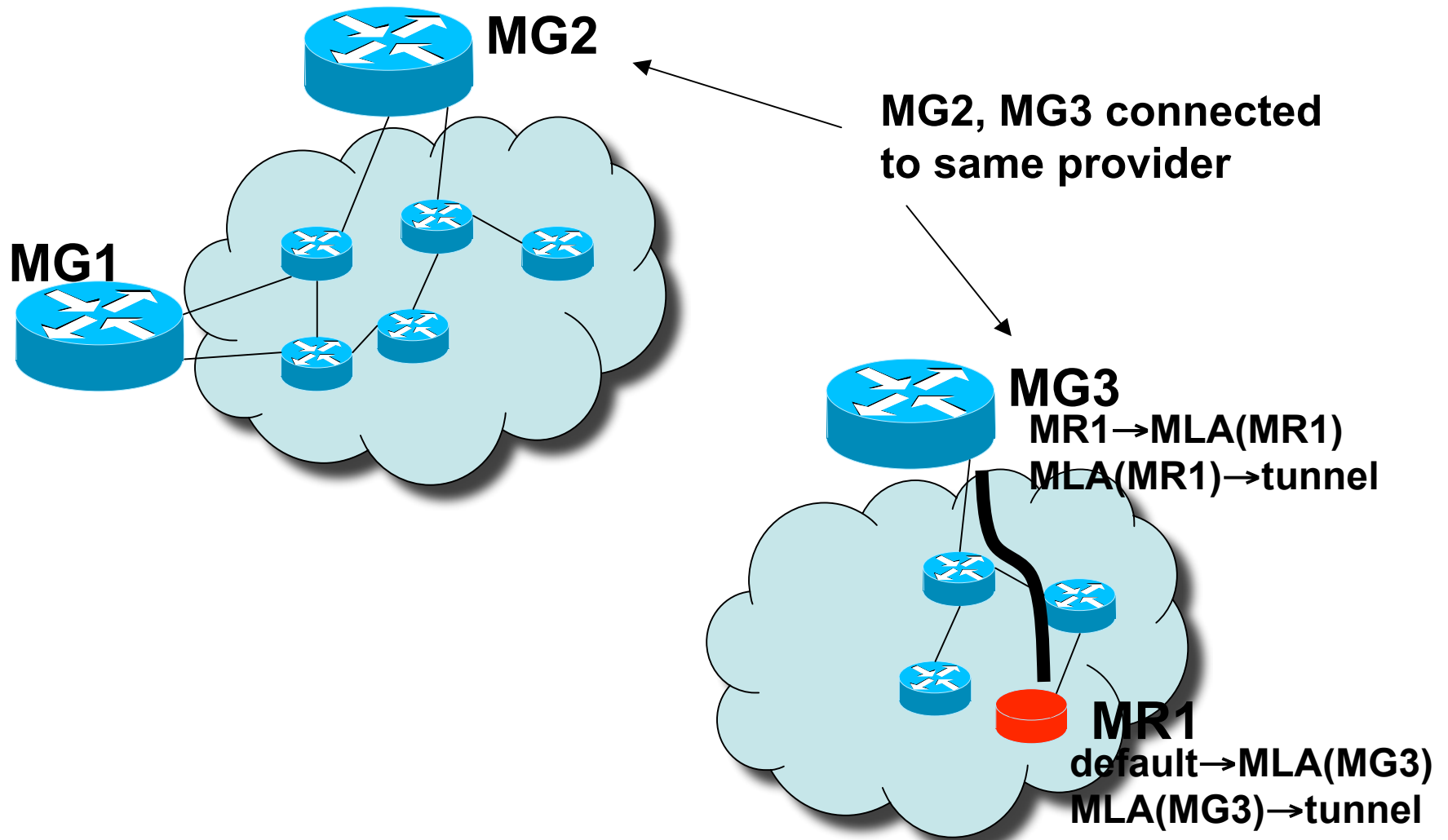
# Route/Tunnel Configuration after MR1 moves within MANET



# Route/Tunnel Configuration after move to MG2 in same MANET



# Route/Tunnel Configuration after move to MG3 in new MANET



# Additional Considerations

- Compatible with “NETLMM using DHCP”
- Works with IPv4 as well as IPv6 (IPv6 has some advantages)
- For IPv4, need a new option (“MLA Option”) to inform relay of MR’s MLA for last-hop forwarding purposes
- Supports DHCPv6 prefix delegation (delegated prefixes move along with the MN)
- tunnels from MGs to MRs are bi-directional (but, tunneling from MR to MG can be omitted if “default” is propagated through MANET)