NEMO for Mobile Ad-hoc Networks

draft-boot-autoconf-nemo4manet-00.txt

Teco Boot

IETF-70

Vancouver, December 2007

My inspiration and intention:

- Autoconf & MANET can (partly) solve the nested NEMO problem (T. Clausen, R. Wakikawa, IETF-69)
- I (quickly) checked Autoconf proposals, I did not find what I was looking for
- I worked on an Autoconf solution, that also fulfills nested NEMO requirements
- I used as many existing components as possible

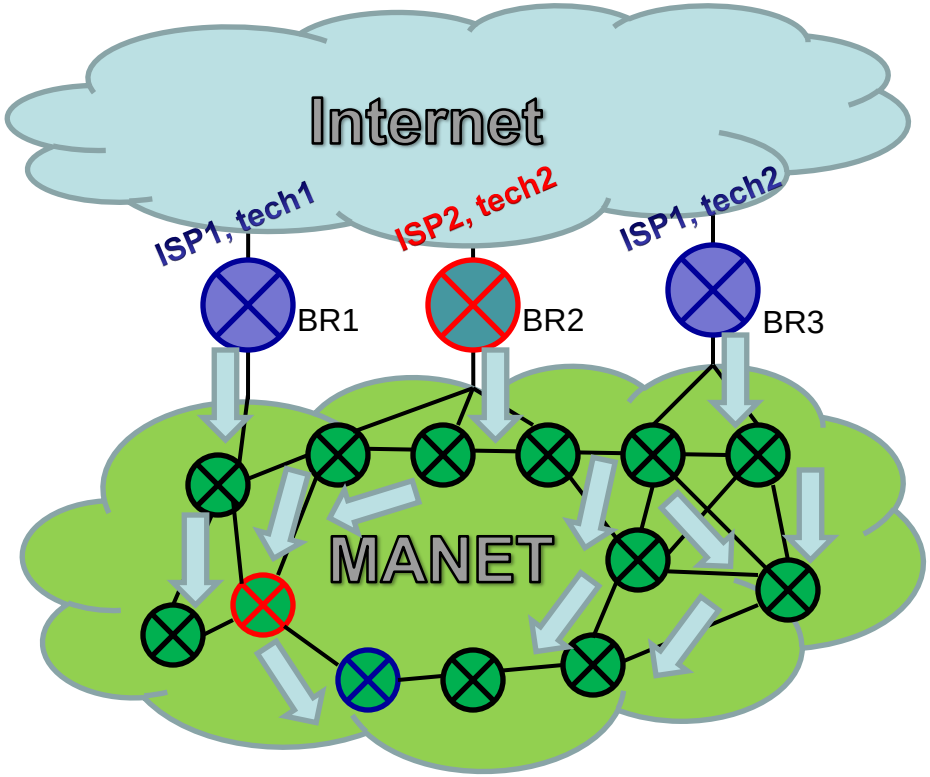
Used components:

- Tree Discovery Protocol (on top of ND Router Advertisements):
  - Redesigned for Autoconf
  - Provides Border Router Prefix
  - New mechanism for loop-free operation
- Address Generation (using existing mechanisms)

Autoconf

- MIP tunnel between MANET Router and Border Router (no change, to be verified), with all the goodies
- Optional NEMO tunnel for session continuity

Step 1a: Border Router Discovery

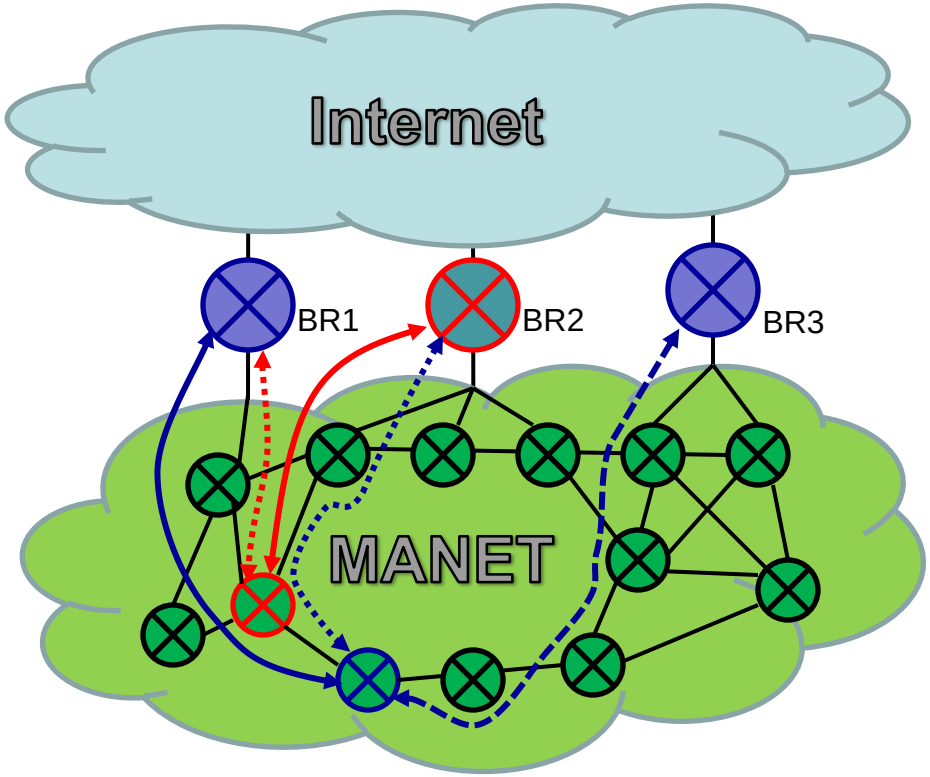


Multiple ISPs, multiple technologies (WLAN, WiMAX, xDSL, 3GPP)

Border Router Information Option (BRIO) flooded in MANET:

- Forwarding: distance vector, some scoping
- ND RA may carry multiple BRIO

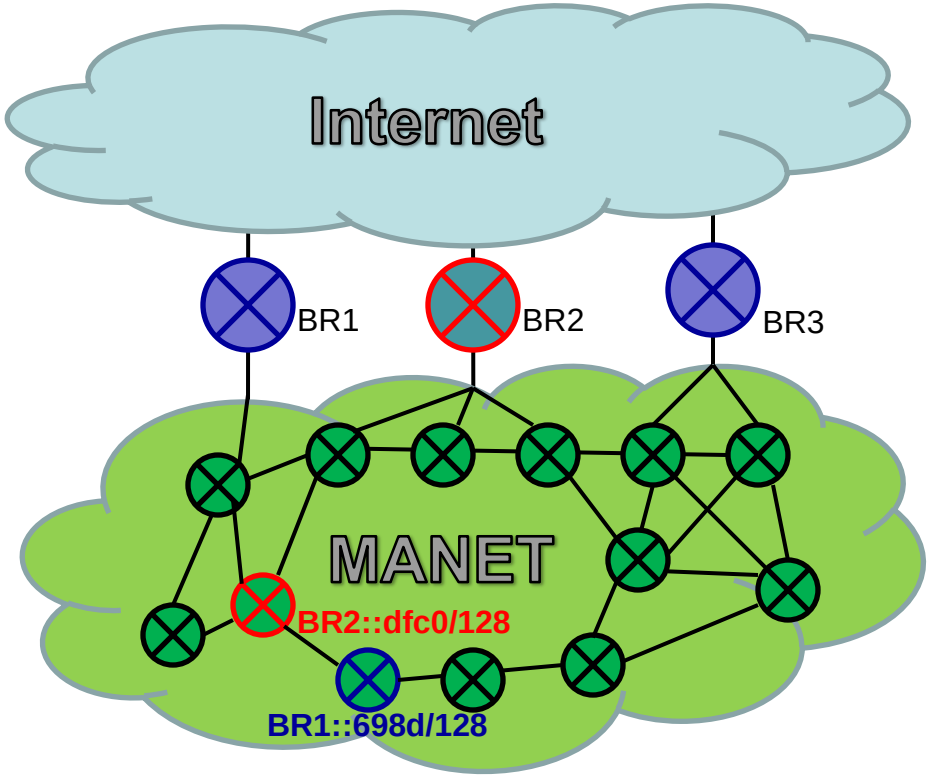
Step 1b: Border Router Discovery



Border Router Selection based on metric and ISP;

- AAA
- Metrics have relation with routing

Step 2: Address generation



MANET routers select a Border Routers for communication to Internet

Generate address: BR prefix and own Interface ID

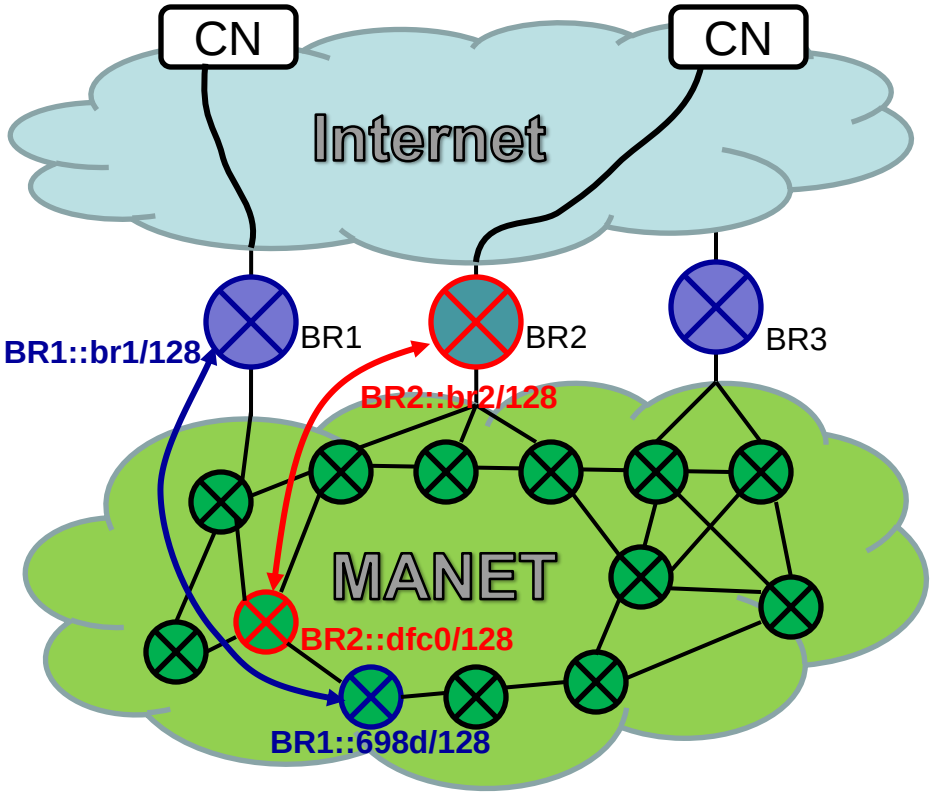
Use Interface IDs that typically are unique:

- MAC address
- Random
- Hash

Duplicate check is OK, but not really needed (it depends….)

- I had to isolate a DAD DoS before

Step 3: Build path to Internet (not really Autoconf…)



Assure traffic is sent via selected BR

Mobile IP used:

- Header compression needed ….
- DSMIPv6: IPv4 support
- Bootstrap & prefix delegation

MANET requirements:

- BR address must be reachable from MNR
- Generated MNR address must be reachable from BR
  - First packet delivery problem towards MNR

Security requirements:

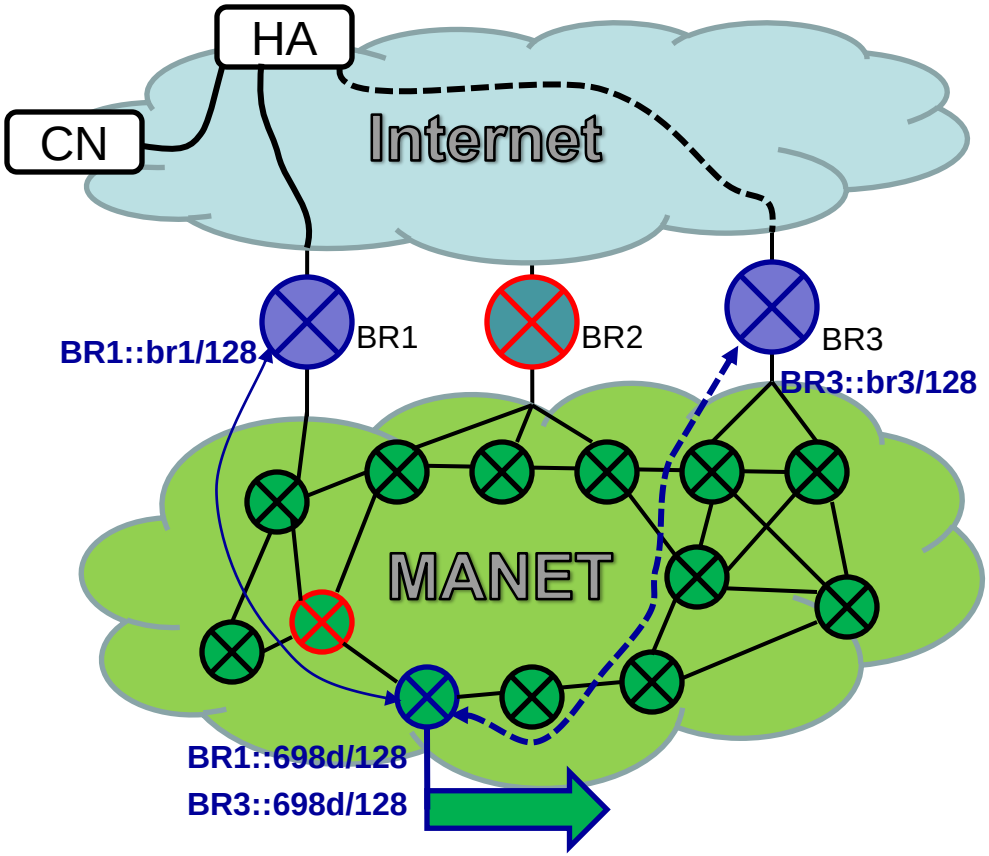
- Could need AAA (ISPs….)
- Anonymity

BRDP-based routing (not Autoconf!!):

- *Path to BR is reverse path BRIO*
- *Path to MNR is BRIO path*
- *Why not using this information??*

Next IETF, MANET WG

Step 4 (NEMO, optional): Update HA (not really Autoconf…)



Movement: metric for BR3 is getting attractive

How to switch to other BR without touching the sessions?

NEMO used:

- Seamless handover (monami6)
- Nesting (two levels of tunneling):
  - Header compression needed

4 tunnels:

- MNR-BR1: BR1::698d – BR1::br1
- MR-HA: BR1::698d – HA
- MNR-BR3: BR3::698d – BR3::br3
- MR-HA: BR3::698d – HA

My next steps:

- Cooperate on finishing Autoconf Problem Statement:
  - Focus on:
    - Connected MANETs
    - Military & public safety networks
- Splitting the current nemo4manet document into:
  - Overview / architecture
  - Border Router Discovery Protocol (BRDP)
  - BRDP-based routing (MANET WG), this provides support for heterogeneous MANET environment

  Rework / refine (any comment is welcome)
- Validate with ISP requirements (AAA, Emergency Response)