IETF-64 Autoconf WG

A Common Framework for Autoconfiguration of Stand-Alone Ad Hoc Networks

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Aims

- Autoconfiguration of unique local address for a stand-alone MANET.
- Not a solution, but a common framework.

Basic Terminologies (1)

- Tentative address – an address whose uniqueness in a MANET is being verified, prior to its assignment to an interface.
- Address generation – a procedure for a node, that has currently no address, to obtain a tentative address in the MANET.

Basic Terminologies (2)

- MANET-wide Duplicate Address Detection (MANET-DAD) – The action of detecting address conflict in the MANET.
  - Pre-Service MANET-DAD – verify that a tentative address is out of address conflict with other MANET nodes.
    - identical in functionality (but not mechanism) to "DAD" (RFC2461/2462)
  - In-Service MANET-DAD – continuously verify that a used address is out of address conflict with other MANET nodes.
    - a fundamentally new to IETF functionality, necessary for MANETs.

Basic Terminologies (3)

- Familiar address – an address is familiar to a node, if the node has seen it in control messages for a sufficiently long period of time.

What are the problems?

Case 1

- Scenario: A node without a pre-assigned local address acquires a new local address.
- A generated address may conflict with those of the existing nodes in the MANET.

Case 2

- Scenario: Two or more MANETs merge.
- Duplicate address may occur.

Baselines of the framework

- Each node should perform both “pre-service MANET-DAD” and “in-service MANET-DAD”.
- MANET-DAD functions could be embedded in routing control messages regardless of pre-service DAD or in-service DAD

  - to reduce autoconfiguration overhead.

  - to allow inter-working between pre-service MANET-DAD and in-service MANET-DAD

  - to suppress routing table contamination.

Related works

- An example of “pre-service MANET-DAD” for a reactive routing protocol was given in [7].
- An example of “in-service MANET-DAD” for proactive and/or reactive routing protocols was given in [1], [6], [13].
- These useful, but individual, schemes are systematically included as the elements in this framework.

Autoconfiguration States

- To realize “pre-service MANET-DAD” and “in-service MANET-DAD” systematically, we use the concept of autoconfiguration states.

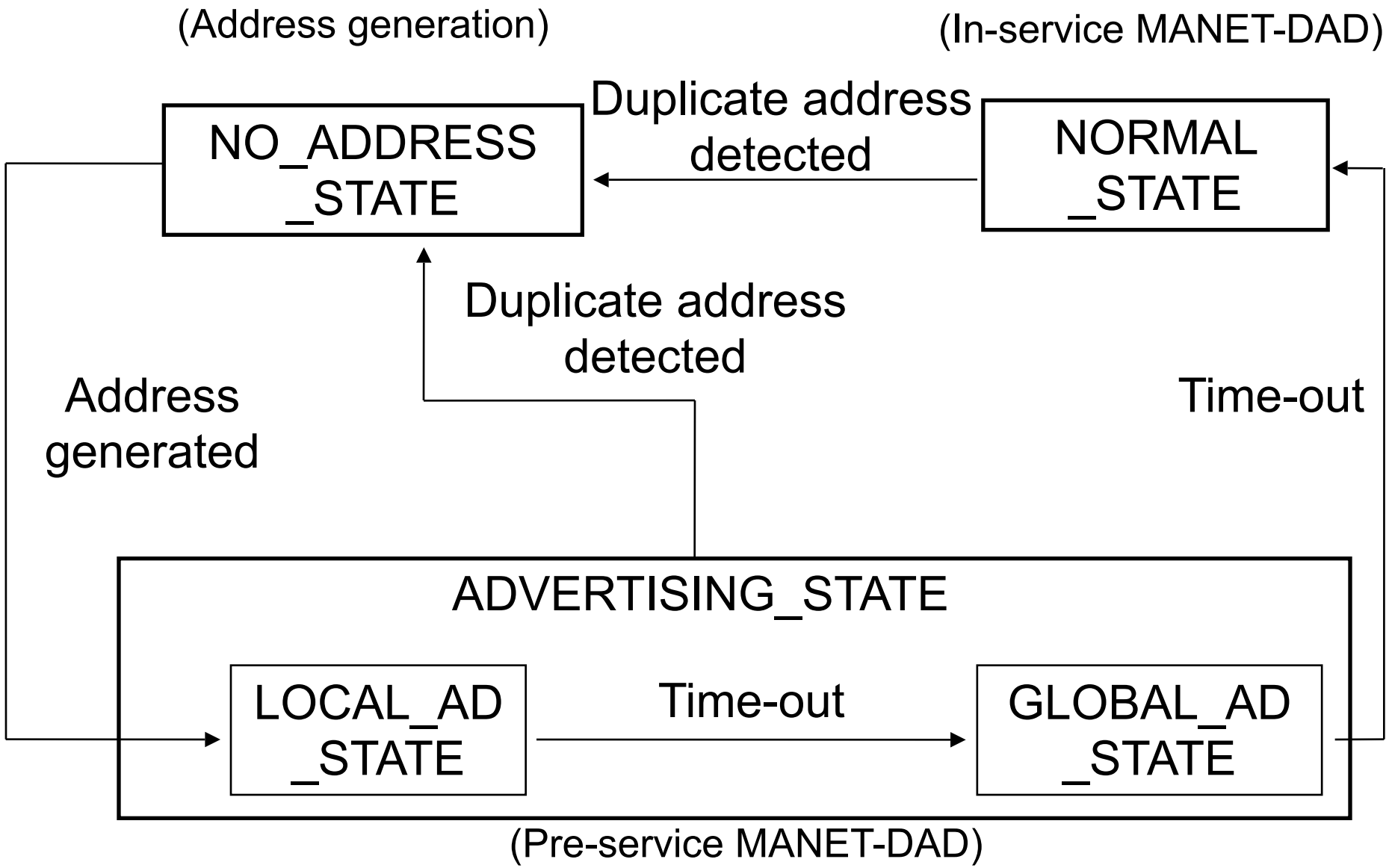

Fig.1 Autoconfiguration state transition diagram.

Additional Benefits of Autoconfiguration States

- The proposed autoconfiguration framework enables a node to gradually enter the MANET using the advertising state.
- When a node is in the advertising state, other nodes in the MANET have a chance to learn information about the node.
- As the result, each node is “familiar” with other nodes in NORMAL_STATE within the connected MANET.
- When network merger occurs, a node may find unfamiliar nodes, allowing it to detect the network merger.
- This leaning mechanism based on the advertising state may be useful for easing the design of in-service MANET-DAD algorithms and for reducing chances of routing table contamination.