Survey of IP address autoconfiguration mechanisms for MANETs draft-bernardos-manet-autoconf-survey-05

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History of the draft

- Version -00 submitted in July 2005
  - WG created in October 2005
- Version -01 submitted in July 2007
  - Updates, change structure, Hassnaa joined
- Version -02 submitted in October 2007
  - Updates
- Version -03 submitted in April 2008
  - Minor update, to keep the ID alive
- Version -04 submitted in November 2008
  - Minor update, to keep the ID alive
- Version -05 submitted in June 2010
  - Updates, new solutions, better aligned to WG status

Waiting for the basic WG documents to progress, so solution design work could take off

Motivation

- Provide a survey covering IP autoconf proposals
- Analyse and classify similar proposed solutions
- Provide a context for understanding the solution space
  - Together with draft-bernardos-autoconf-solution-space-02, provide a good review and analysis of solution space

Solutions analyzed

- More than 24 solutions analyzed
- Classified in two big groups:
  - For Standalone MANETs
  - For Connected MANETs
  - Each group divided in two:
    - Without merging support
    - With merging support
  - This classification was just meant to provide some structure, it probably needs to be changed

Characteristics analyzed (I)

- MANET Scenario
  - Standalone MANETs
    - No need for global IP addresses
  - Connected MANETs
    - Global IP addresses needed
    - Gateways might be involved

Characteristics analyzed (II)

- Routing Protocol Dependency
  - Dependent
  - Utilize information from routing protocol
  - Independent
- Address uniqueness
- Distributed/centralized approach
- Partitioning/Merging support
  - Detect MANETs' partitioning
  - Detect MANETs’ merging
  - Avoid IP address conflicts in such cases

Characteristics analyzed (III)

- Prefix assignment support
  - Address assignment
  - Prefix delegation
- Protocol overhead
  - Additional message flooding
  - Local signalling
  - Piggybacking of messages into routing protocol
  - Passive behaviour

draft-bernardos-autoconf-solution-space-02
Issues of MANET autoconf solutions

- Additional signalling overhead
- Increased protocol complexity and processing load
- Scalability
- Security considerations
- Convergence time
- Routing protocol dependency
- IP address space assignment efficiency

Draft-bernardos-autoconf-solution-space-02 IP autoconf solution space analysis (1)

- Which entities are involved?
  - MANET Routers (distributed approach)
  - MANET Routers and Border Routers
  - MANET Routers and distributed servers
  - MANET Routers and centralised server(s) (centralised approach)
- What type of IP delegation: addresses or prefixes?
- How are IP addresses obtained?

draft-bernardos-autoconf-solution-space-02 IP autoconf solution space analysis (2)

- How is IP address uniqueness guaranteed?
  - How is address uniqueness detection performed?
  - When address uniqueness detection is performed: pre-service and/or in-service?
  - How are address conflicts resolved?
- How is signalling performed?
- Are existing protocols modified?
- What are the security considerations?

Next Steps

- Keep the document updated
- Merge with draft-bernardos-autoconf-solution-space-02 and come up with a solution space alike draft (similar to RFC4889?)
- Could be a good starting point for survey/solution space informational document (if re-chartered to do so)
  - Authors are willing to do the job

Classification results (I)

- MANET Scenario
  - Standalone MANETs: 11/24 → 46%
  - Connected MANETs: 13/24 → 54%
    - Gateway involvement
      - IGW involved: 9/13 → 69%
      - IGW not involved: 4/13 → 31%
- Address uniqueness
  - Pre-service DAD: 12/24 →50%
  - In-service DAD: 5/24 →21%
  - DAD-free: 7/24 → 29%

Classification results (II)

- Routing Protocol Dependency
  - Independent: 15/24 → 62%
  - Dependent: 9/24 → 38%
- Distributed/centralized approach
  - Centralized: 2/24 → 8%
  - Fully distributed: 12/24 → 50%
  - Partially distributed: 10/24 → 42%
- Partitioning/Merging support
  - Yes: 15/24 → 62%
  - No: 9/24 → 38%

Classification results (III)

- Prefix assignment support
  - Yes: 6/24 → 25%
  - No: 18/24 → 75%
- Protocol overhead
  - Message flooding: 13/24 → 54%
  - Local signalling/piggybacking: 8/24 → 33%
  - Passive: 3/24 → 13%