SMF-05 ID Update

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Changes -04 to -05

- Abstract and front end of ID simplified
- Applicability and Scope section reorganized
  - Shortened and simplified in Intro and Scope
  - Short Applicability section
- Editorial Changes throughout
- Hash mechanism for DPD added as an alternative to sequence-based
  - Definition of checking and collision testing (e.g.,non-mutable)
- IPv6 Header Option updated to add needed hash assistance option
- CDS Interaction discussion simplified
- CDS pseudocode added in Appendix (thanks Justin)
- Good mailing list discussion and direct feedback

IPv6 Header Option Changes

- Added the optional hash-based Duplicate Packet Detection (DPD) header and described use mechanism
- Hash Assist Value (HAV) included in option header on demand when collision detected
- Allows for future flexibility but defines a default
- Present approach should be sufficient to support experiments and support implementation interoperability

IPv6 Hop-by-hop Header Option

```
    0                   1                   2                   3
     0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1
    +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
                   ...                 | Option Type   | Opt. Data Len |
    +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
    |0|IDTyp| IDLen |         Tagger ID (optional              |
    +-+-+-+-+-+-+-+-+                   +-+-+-+-+-+-+-+-+-+-+-+-+-+-+
    |                                   | DPD Sequence Value  ...
    +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+

            Fig. 3 - IPv6 SMF-DPD Header Option in S-DPD mode


    0                   1                   2                   3
     0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1
    +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
                   ...                 | Option Type   | Opt. Data Len |
    +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
    |1|    Hash Assist Value (HAV) ...
    +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+

            Fig. 5 - IPv6 SMF-DPD Header Option in H-DPD mode
```
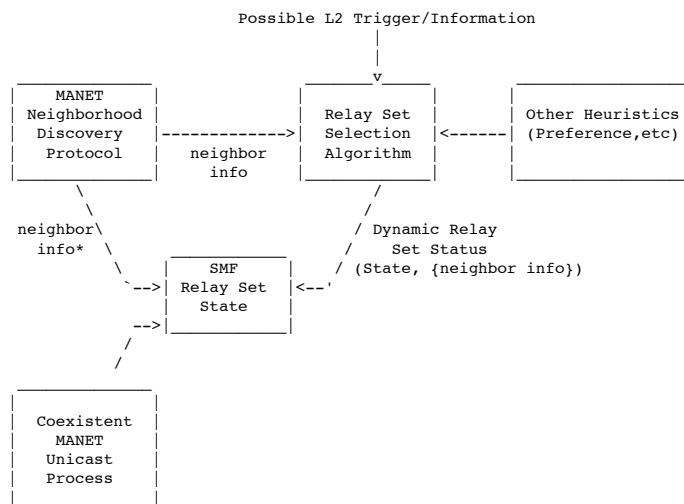
Reduced Relay Set Interaction Cases

1. Unicast dependent operation with a coexisting MANET unicast routing protocol (e.g., MANET-OSPF, OLSR) in which the relay set state is derived from the unicast CDS information.

2. Unicast independent operation in which SMF performs its own Relay Set Selection and derives dynamic neighborhood information from a MANET NHDP process. Additional TLV definitions for related CDS collection may be required as specified in the Appendices.

3. Possible crosslayer implementation that uses L2 neighborhood information and possible triggers to assist the dynamic relay set selection and maintenance process.

Types of Relay Set Interactions

```
                          Possible L2 Trigger/Information
                                        |
                                        |
                                        v
 _____          _____          _____
|   MANET      |        |              |        |              |
| Neighborhood |        |  Relay Set   |        | Other Heuristics |
|  Discovery   |------------->| Selection |<------| (Preference,etc) |
|  Protocol    | neighbor | Algorithm  |        |              |
|_____|   info   |_____|        |_____|
        \                          /
         \                        /
  neighbor\                      / Dynamic Relay
    info*   \                   /     Set Status
             \     _____     / (State, {neighbor info})
         `-->|  SMF    |<--'
             | Relay Set |
             |  State   |
         -->|_____|
           /
          /
 _____
|              |
|  Coexistent  |
|    MANET     |
|   Unicast    |
|   Process    |
|_____|
```

Document Strategy Plan

- Delayed WGLC target
  - Cleaned up document more than expected
  - Added hash inclusive design
- This was worth it IMHO
- Publish -06 within 1-2 weeks
- Still EXP submission intention
- Target WGLC in 4 weeks

Some Open Issues

- Early work on SMF decided not to support IPv4 multicast packet fragmentation and recommends DF settings
  - The editor would like to keep the EXP submission this way.
  - WG thoughts? Don't forget this is multicast

- Use of IPv4 ID in DPD context
  - Avoids any IPv4 options header and encapsulation
  - Working code and issues discussed in document
  - Editor would like to leave as is for EXP submission
  - IPSEC packets avoid technique
  - Future Possibilities:
    - e.g., Encapsulation, IPv4 hash approach, header options.

- Detailed Border Gateway Solutions
  - Multiple Gateway Issues: Stated to be future detail

- Security Considerations for EXP
  - Hash vs. Sequence-based DOS: Add some text.

- Can we move forward as EXP?

Ongoing Prototyping/Testing

- SMF has been getting additional experimental practice
  - Working code and experiments
  - Simulation code also
- Open implementations with unicast routing interface for CDS sharing available
  - MANET-OSPFv3 quagga code
    - Additional E-CDS filtering working
  - NRL-OLSR implementation
    - S-MPR used for unicast but several CDS available for experimentation
  - Code working in multiple OSes and network simulators
- NHDP+SMF in the works (NRL prototype)
- Newer optional hash support in development
- Operational PIM gateways operational and approaches being examined (Boeing, NRL, etc)