OSPFv3: Homenet and Data Centers

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Homenet Requirements

- Homenet is trying to develop supporting technologies for a very simple, but technologically advanced, home
  - Primarily focused on IPv6
  - Zero Configuration if at all possible
  - Interface to Smart Grid technologies including Zigbee/802.15.4
  - Multi-subnet with routing an option
  - Potentially multihomed to multiple ISPs
  - Edge Routing to resolve BCP 38 issues
I have been asked about OSPF-Multi-Topology.

Topologies are defined by metrics on links between router interfaces within the routing domain.

The link does or does not have a metric within the topology.

Automatically routes around discrepancies between physical and logical topology.

A number of source/destination routing cases could be:

- Edge routing is routing to a default route that is outside the routing domain.

The OSPFv3 topologies for each PA prefix are identical.

There is no link advertised in OSPFv3 that might have the indicated metric.

Edge routing is a reachability problem, not a topology problem.
Context

- RFC 5340 defines three prefix LSAs
  - Fixed format, which makes it hard to add information to them
- I’m looking at
  - Homenet requirements for egress routing
  - Multi-tenant Data Center requirements for tenant-to-tenant access control
I defined three extensible LSAs, replacements for intra-area-prefix-LSA, inter-area-prefix-LSA, and AS-external-LSA.

I have since been told of Abhay Roy’s extensible LSA draft in draft-ietf-ospf-mt-ospfv3 (2007).

I’ll use whatever extensible technology the WG approves.
Flow label and Source Address sub-TLVs

- Premise:
  - Reachability TLV, with sub-TLV(s), identifies a set of possible messages to send down a route
  - Need comments on route calculation and FIB design
Route Calculation

- Normal OSPFv3 route calculation:
  - Identifies a sequence of routers and links from calculating router to router advertising TLV
  - “Router” might be a Network LSA
- LSA, in this case, identifies not only the destination but a qualification
  - Traffic with a different source address or flow label follows a different route, or no route
Backward compatibility

- Acee asked about making this work in networks with RFC 5340 format LSAs as well
- Really not a problem:
  - Definition of source prefix sub-TLV:
    - A zero-length LSA (::/0) can be represented with a sub-TLV whose length is zero or no sub-TLV
  - Definition of flow label sub-TLV:
    - “any” flow label is specified by leaving the sub-TLV out
- RFC 5340 LSA by definition leaves those sub-TLVs out. Semantically equivalent.
FIB Design

- Not subject to standardization.
- Some suggestions in an appendix
  - Linux (Waikato extensions) has separate FIBs by source prefix.
    - One could insert destination into appropriate FIB, or all FIBs if source not specified
  - PATRICIA tree
    - Allows a discontiguous bit string, differing don’t-care sets
    - Recursive descent following most useful bits
    - Final answer compared to entire specification
Possible use cases

Source Prefix

- Egress Routing
  - Most TLVs in network destination-only
  - Default routes to upstream specify PA source prefix
- One could imagine more general uses, such as dynamic “ACL”

Flow Label (RBAC model)

- Long discussion about use of the Flow Label in the IETF, with many suggestions
- One could also use it as a tenant id in a multi-tenant data center
  - IPsec or TLS still required for proper end-to-end security
  - Tagged route limits attack possibilities to neighbors that know the “password”