IS-IS TE attributes per application
draft-ginsberg-isis-te-app-03

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Motivation

TE Link Attribute Advertisements presume enablement of RSVP-TE on a link

When multiple TE applications are in use:

• no way to indicate what applications are using attribute values on a given link
• no way to advertise application specific values

Inspired by and functionally equivalent to

draft-ppsenak-ospf-te-link-attr-reuse
Requirements

• Per application/per link attribute usage
  – NOT enablement
• Per application attribute values
• Efficient encoding
  – (avoid duplicate advertisements when possible)
• Support incongruent topologies/application
• Extensible to new applications
• Support partial deployment
• Backwards Compatible
  – No changes to legacy routers required
• Allow BGP-LS/Controller supports of apps
Application Identifier Bit Mask
(changed from V00)

0 1 2 3 4 5 6 7
+-+-+-+-+-+-+-+-+-+-+
|    SABML+F        | Standard App Bit Mask Length + Flag (1)
+-+-+-+-+-+-+-+-+-+-+
|    UDABML+F       | User Defined App Bit Mask Length + Flag
+-+-+-+-+-+-+-+-+-+-+
|    SABM           ... Standard App Bit Mask (0 – 127)
+-+-+-+-+-+-+-+-+-+-+
|    UDABM          ... User Defined Bit Mask (0 – 127)
+-+-+-+-+-+-+-+-+-+-+

SABML+F 0 1 2 3 4 5 6 7
+-+-+-+-+-+-+-+-+-+-+
|L|  SA-Length  |  L-flag: Use Legacy Advertisements
+-+-+-+-+-+-+-+-+-+-+

UDABML+F 0 1 2 3 4 5 6 7
+-+-+-+-+-+-+-+-+-+-+
|R| UDA-Length  | R: Reserved. Tx as 0/Ignored on Rx
+-+-+-+-+-+-+-+-+-+-+
Standard Application Bit Mask
(changed from V00)

SABM (variable length)

This is omitted if SA-Length is 0. Legacy Bit moved to flags.

0 1 2 3 4 5 6 7 ...
+-+-+-+-+-+-+-+-+...
|R|S|F| ... 
+-+-+-+-+-+-+-+-+...

R-bit: RSVP-TE
S-bit: Segment Routing Traffic Engineering
F-bit: Loop Free Alternate
New sub-TLV for TLV 22,23,141,222,223

Application Bit Mask (variable)
Link Attribute sub-sub-TLVs – one for each of:

<table>
<thead>
<tr>
<th>Administrative group (color)</th>
<th>Min/Max Unidirectional Link Delay</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max link bandwidth</td>
<td>Unidirectional Delay Variation</td>
</tr>
<tr>
<td>Max reservable link bandwidth</td>
<td>Unidirectional Link Loss</td>
</tr>
<tr>
<td>Unreserved bandwidth</td>
<td>Unidirectional Residual Bandwidth</td>
</tr>
<tr>
<td>Extended Administrative Group</td>
<td>Unidirectional Available Bandwidth</td>
</tr>
<tr>
<td>Unidirectional Link Delay</td>
<td>Unidirectional Utilized Bandwidth</td>
</tr>
</tbody>
</table>

Only one new sub-TLV required
Sub-sub-TLVs match corresponding sub-TLV code point/format
New TLV for Application Specific SRLG

Neighbor System-ID + pseudo-node id (7 octets)
Application Bit Mask (variable)
Length of sub-TLVs (1 octet)
Link Identifier sub-TLVs (variable)
0 or more SRLG values (4 octets/SRLG)

Unlike existing SRLG (TLVs 138 and 139) this supports IPv4, IPv6, and unnumbered Link Identifiers:

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Link Local/Remote Identifiers (see [RFC5307])</td>
</tr>
<tr>
<td>6</td>
<td>IPv4 interface address (see [RFC5305])</td>
</tr>
<tr>
<td>8</td>
<td>IPv4 neighbor address (see [RFC5305])</td>
</tr>
<tr>
<td>12</td>
<td>IPv6 Interface Address (see [RFC6119])</td>
</tr>
<tr>
<td>13</td>
<td>IPv6 Neighbor Address (see [RFC6119])</td>
</tr>
</tbody>
</table>
Deployment Cases:
1) RSVP-TE only

Use Legacy advertisements
Deployment Cases:
2) Multiple Apps – one of which is RSVP-TE

Common Attributes
Congruent Topologies

Use Legacy advertisements
Advertise new sub-TLV once/link w L-flag set
Backwards compatible
No advertisement duplication
3 extra bytes/link independent of how many attributes are advertised
Deployment Cases:
3) Multiple Apps – All Attributes NOT shared w RSVP-TE and/or incongruent topologies

Use Legacy advertisements for RSVP-TE
Use new advertisements w L-flag clear
Backwards compatible
Advertisement duplication in cases where some attributes are shared w RSVP-TE
Some Use Cases for Application Specific Attributes

• Using TE metric/bandwidth to influence LFA selection.
• Incongruent topologies for different applications
• Use different attributes for SR-TE vs RSVP-TE engineered paths.
• Defining a separate set of SRLGs in support of rerouting around a non-local catastrophic event e.g. a natural disaster affecting all traffic through a particular geographic area.
Alternative Proposal

- draft-hegde-isis-advertising-te-protocols-02/draft-bowers-isis-te-attribute-set-00
- draft-hegde-ospf-advertising-te-protocols-00
- At IETF 97 it was agreed that one proposal needs to be selected by the WG
- Both OSPF and IS-IS should select functionally equivalent proposals
WG Adoption Requested

Chairs initiated poll on 6/28/2017
13 in favor/1 against/1 neutral
## Comparison

<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>Per application/link usage</td>
<td>Supported</td>
<td>App enablement</td>
</tr>
<tr>
<td>Per application attribute value</td>
<td>Supported – explicit indication</td>
<td>Supported – Legacy assumed unless overridden</td>
</tr>
<tr>
<td>Avoid duplication</td>
<td>Supported</td>
<td>Supported</td>
</tr>
<tr>
<td>Incongruent app topologies</td>
<td>Supported</td>
<td>Legacy advertisements used in absence of app specific</td>
</tr>
<tr>
<td>Backwards Compatibility</td>
<td>Supported (uses duplicate advertisements)</td>
<td>Not supported</td>
</tr>
<tr>
<td>Partial Deployment</td>
<td>Supported (uses duplicate advertisements)</td>
<td>Supported w config changes on legacy routers</td>
</tr>
<tr>
<td>Extensible to new applications</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>BGP-LS/Controller Support</td>
<td>For standard applications</td>
<td>No</td>
</tr>
<tr>
<td>User Defined Apps</td>
<td>Supported</td>
<td>Supported</td>
</tr>
</tbody>
</table>