OSPF Extensions for BIER-TE

draft-chen-bier-te-ospf-00

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• Every BFER’s ID (BFR-id) has been distributed in network, called local-decap adjacency in BIER-TE
• A Bit Position (BP) is configured on an end of a link, called forward-connected (fw-con) adjacency in BIER-TE

➢ Every Bit Position (BP) is distributed in network by OSPFv2
Benefits of BP Distribution

- Every BFIR can compute an explicit P2MP BIER-TE path across the network.
- Every BFR can compute a local backup path from the BFR to a BFR-NBR’s next hop and use the path to fast protect the BFR-NBR.
- For example, BFR B can compute a local backup path from B to each of C’s next hops F, D and I for fast protecting C’s failure.

<table>
<thead>
<tr>
<th>BFR-NBR</th>
<th>Backup Paths</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>B→F:{2',22’}, B→D:{6',20',27’}, B→I:{6',17’}</td>
</tr>
</tbody>
</table>
OSPFv2 has “Extended Link Opaque LSA”

OSPFv2 Extended Link Opaque LSA

OSPFv2 Extended Link TLV
Extensions to OSPFv2: **BIER-TE Sub-TLV**

<table>
<thead>
<tr>
<th>Type (TBD1)</th>
<th>Length (Variable)</th>
</tr>
</thead>
<tbody>
<tr>
<td>sub-domain-id</td>
<td>MT-ID</td>
</tr>
<tr>
<td>BitPosition</td>
<td>DrEndBitPosition</td>
</tr>
<tr>
<td>Sub-Sub-TLVs (variable)</td>
<td></td>
</tr>
</tbody>
</table>

**BIER-TE Sub-TLV**

- **sub-domain-id:** It identifies a BIER-TE sub-domain.
- **MT-ID:** It identifies the topology associated with the sub-domain.
- **BAR:** BIER Algorithm used to calculate underlay paths to other BFRs.
- **IPA:** IGP Algorithm used to either modify, enhance, or replace the calculation of underlay paths to reach other BFRs as defined by the BAR value.
- **BitPosition:** It is the BitPosition locally configured on a P2P or broadcast link.
- **DrEndBitPosition:** It is the BitPosition of a broadcast link on the DR end.
Next Steps

- Welcome comments
OSPFv3 Extensions for BIER-TE

draft-chen-bier-te-ospfv3-00

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OSPFv3 has “Extended Router LSA”

| 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 |
| LS Age | 0x21 |
| Link State ID |
| Advertising Router |
| LS sequence number |
| LS checksum | Length |
| Options | TLVs (variable) |
| ~ Including Router Link TLV ~

OSPFv3 Extended Router LSA

| 0 1 2 3 4 5 6 7 8 9 0 1 |
| Type (1) | Length (Variable) |
| Link Type | Metric |
| Interface ID |
| Neighbor Interface ID |
| Neighbor Router ID |
| Sub-TLVs (variable) |
| ~ Including BIER-TE Sub-TLV ~

OSPFv3 Router Link TLV
Extensions to OSPFv3: **BIER-TE Sub-TLV**

<table>
<thead>
<tr>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>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</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| +---------------------------------+------------------+------------------+
| | Type (TBD1) | Length (Variable) | 
| +---------------------------------+------------------+

| +---------------------------------+------------------+------------------+
| | sub-domain-id | MT-ID | BAR | IPA | 
| +---------------------------------+------------------+------------------+

| +---------------------------------+------------------+
| | BitPosition | DrEndBitPosition | 
| +---------------------------------+------------------+

| +---------------------------------+------------------+
| | Sub-Sub-TLvs (variable) | 
| +---------------------------------+------------------+

**BIER-TE Sub-TLV**

- **sub-domain-id:** It identifies a BIER-TE sub-domain.
- **MT-ID:** It identifies the topology associated with the sub-domain.
- **BAR:** BIER Algorithm used to calculate underlay paths to other BFRs.
- **IPA:** IGP Algorithm used to either modify, enhance, or replace the calculation of underlay paths to reach other BFRs as defined by the BAR value.
- **BitPosition:** It is the BitPosition locally configured on a P2P or broadcast link.
- **DrEndBitPosition:** It is the BitPosition of a broadcast link on the DR end
Next Steps

- Welcome comments
IS-IS Extensions for BIER-TE

draft-chen-bier-te-isis-00

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IS-IS has “TLVs of Type 22, 222”

Extended IS Reachability TLV (Type 22)

MT Intermediate Systems TLV (Type 222)
Extensions to IS-IS: BIER-TE Sub-TLV

```
0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
| Type (TBD1) |    Length     |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
| sub-domain-id |    BAR       |    IPA    |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|     BitPosition     | DisEndBitPosition |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                     Sub-Sub-TLVs (variable)                     |
~
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
    BIER-TE Sub-TLV
```

- **sub-domain-id**: It identifies a BIER-TE sub-domain.
- **MT-ID**: It identifies the topology associated with the sub-domain.
- **BAR**: BIER Algorithm used to calculate underlay paths to other BFRs.
- **IPA**: IGP Algorithm used to either modify, enhance, or replace the calculation of underlay paths to reach other BFRs as defined by the BAR value.
- **BitPosition**: It is the BitPosition locally configured on a P2P or broadcast link.
- **DisEndBitPosition**: It is the BitPosition of a broadcast link on the DIS end.
Next Steps

- Welcome comments