

Link State(LS) Flooding Reduction

draft-cc-ospf-flooding-reduction-04

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Overview

00 version: Distributed mode. Every node computes flooding topology using same algorithm. mentioned distributed, central, static modes

01 version: Allow operators to

- Select a mode: Distributed, Central, xor Static
- Chose Algorithm for computing flooding topology
- Enable Flooding Reduction and Roll Back smoothly

04 version:

- For central and distributed modes,
 - Backup Paths: backup flooding topology split
- For central mode,
 - Message for flooding topology, including a block encoding
 - Encoding for backup paths
- Protocol extensions: OSPFv2, OSPFv3 and IS-IS

Backup for Flooding Topology Split

Construct a flooding topology

- reduces the amount of LS flooding greatly (≡ slim) and
- is tolerant to multiple failures (≡ fat)

This is hard

To get around this

- use backup paths for critical nodes and links on flooding topology
- Flooding topology can be slim and tolerant to failures

Critical node goes down ≡ flooding topology is split into parts

- Backup paths for node connects split parts into one
- Through backup paths and remaining flooding topology, LS can be flooded to every live node

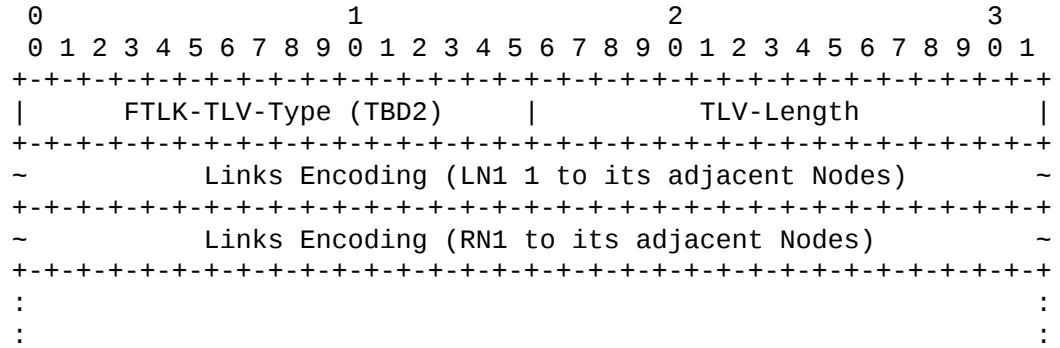
Multiple links and nodes failures

- Through backup paths for these links and nodes + remaining flooding topology, LS can be flooded to every live node

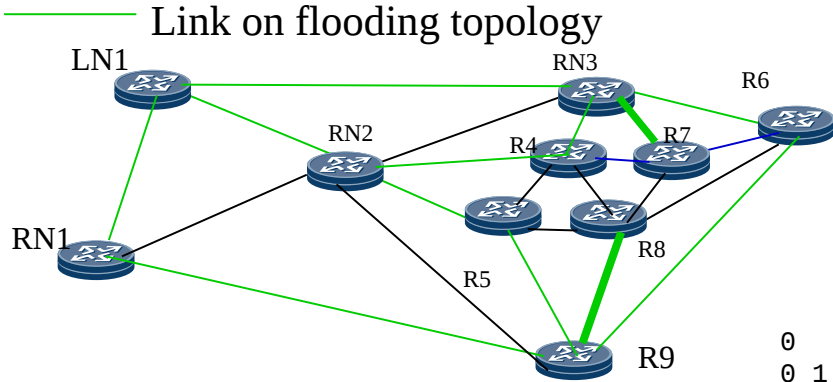
Message for Flooding Topology: LSA

Flooding Topology Links TLV

- links encodings

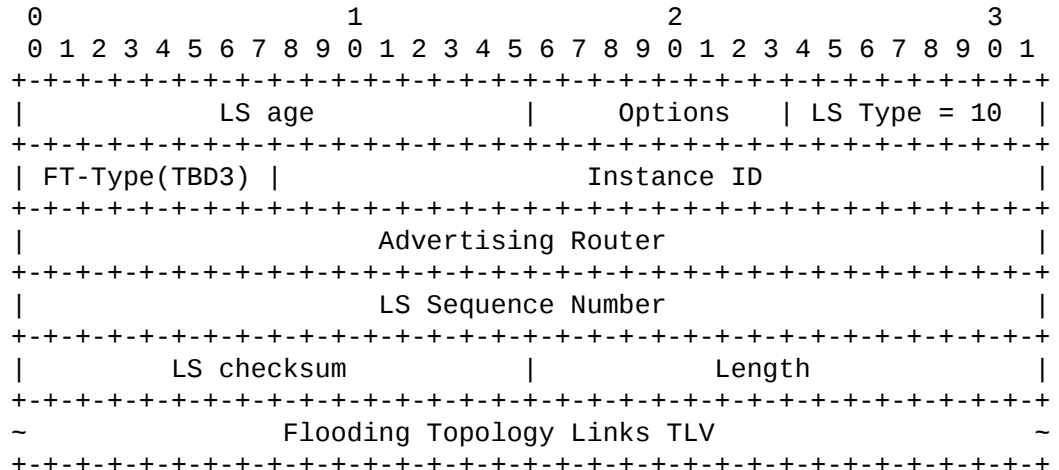


Flooding Topology Links TLV



Flooding Topology Opaque LSA

- Links TLV



Block Encoding

A single structure encoding a block (or part) of topology

Links encoding is extended to include [links connected to adjacent nodes](#)

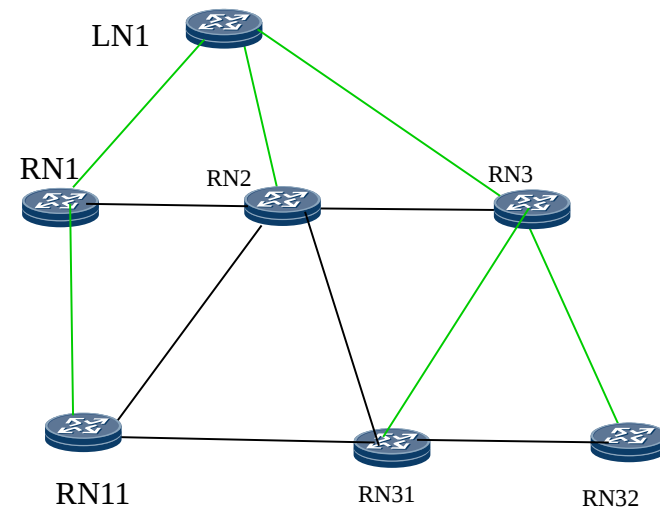
- Extending Flags (**E Flags** for short) between NN and CNIs for the adjacent nodes
- E Flags is NN bits, each bit i is for a node. $i=1$: links to adjacent node RN_i included

```

0 1 2 3 4 5 6 7 8
+-----+-----+-----+
|0 0 0|          ENSI (3 bits) [9 bits CNI] |
+-----+-----+-----+ } Encoding for
| LN1 Index Value | CNI (9 bits)           | Local Node LN1
+-----+-----+-----+
|0 1 1|          NN(3 bits)[3 adjacent nodes]|
+-----+-----+-----+
|1 0 1|          E Flags [NN=3 bits]         | Encoding for
+-----+-----+-----+ } 3 adjacent nodes
| RN1's Index   | CNI (9 bits) for RN1       | (RN1, RN2, RN3)
+-----+-----+-----+ } of LN1
| RN2's Index   | CNI (9 bits) for RN2
+-----+-----+-----+
| RN3's Index   | CNI (9 bits) for RN3
+-----+-----+-----+
|0 0 1|          NN (3 bits)[1 adjacent node]|
+-----+-----+-----+
|0|              E Flags [NN=1 bit]         | Encoding for
+-----+-----+-----+ } 1 adjacent node
| RN11's Index  | CNI (9 bits) for RN11          | (RN11)
+-----+-----+-----+ } of RN1
|0 1 0|          NN(3 bits)[2 adjacent nodes]|
+-----+-----+-----+
|0 0|           E Flags [NN=2 bits]         | Encoding for
+-----+-----+-----+ } 2 adjacent nodes
| RN31's Index  | CNI (9 bits) for RN31          | (RN31, RN32)
+-----+-----+-----+ } of RN3 as a
| RN32's Index  | CNI (9 bits) for RN32          | local node
+-----+-----+-----+

```

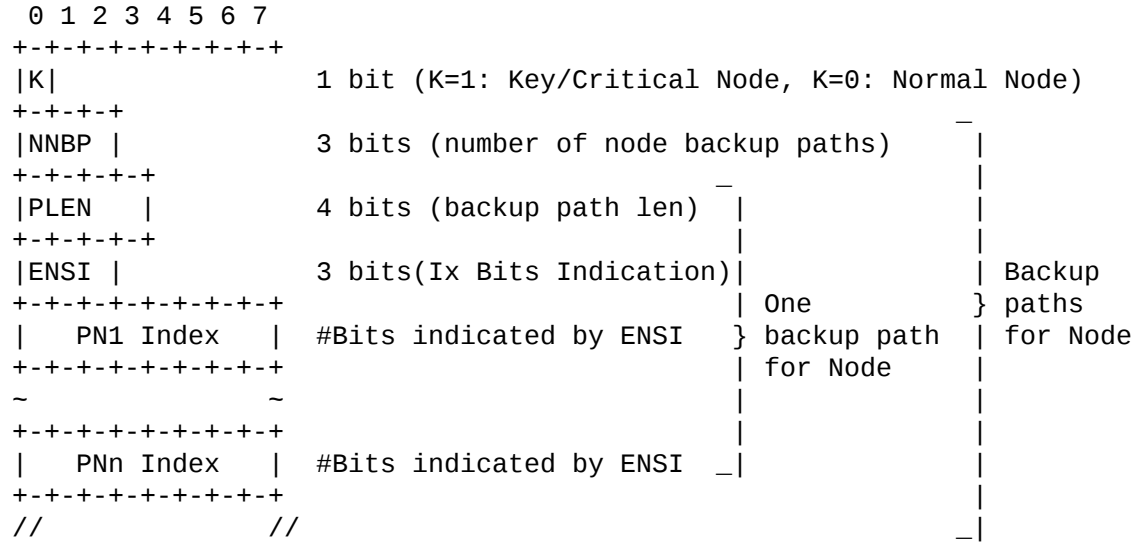
— Link on flooding topology



Encodings for Backup Paths: Node

Backup paths for a node:

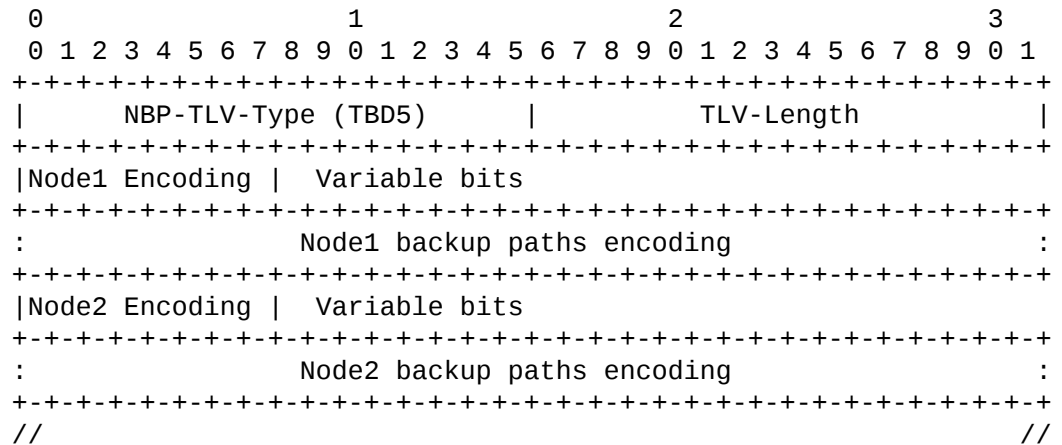
- node index encoding +
- **node backup paths encoding**



K flag (Key/Critical node flag) of 1 bit
 3 bits NNBP(number of node backup paths)
 path length PLEN of 4 bits (number of nodes)
 ENSI for all the nodes in the path

Node Backup Paths TLV:

- **multiple nodes and their backup paths**

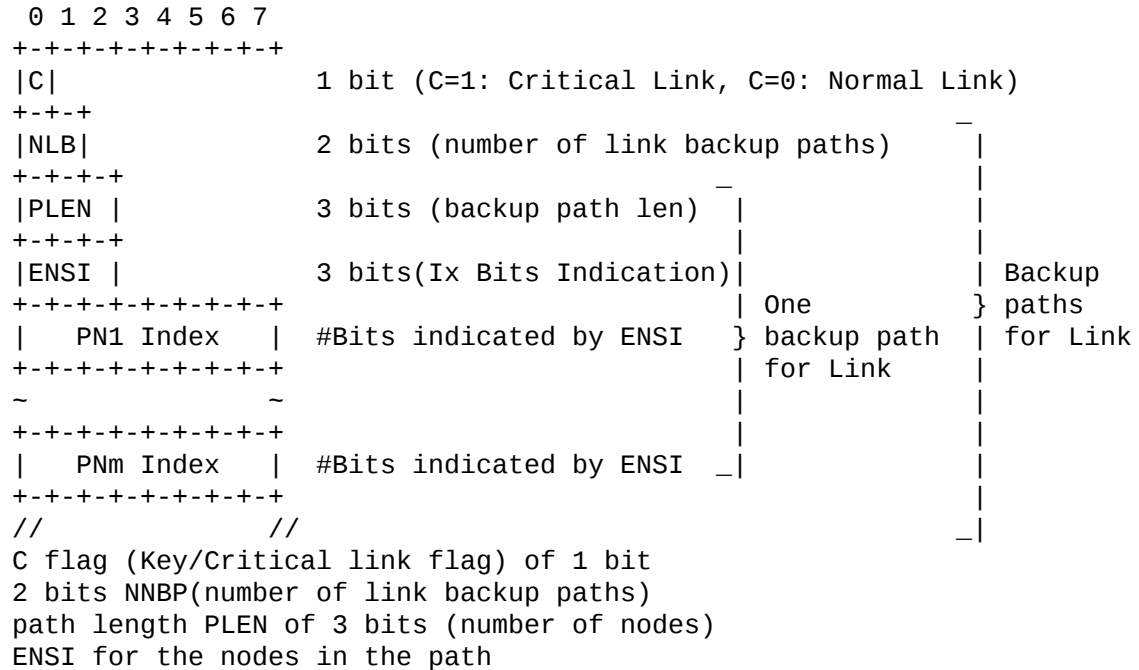


Node Backup Paths TLV

Encodings for Backup Paths: Link

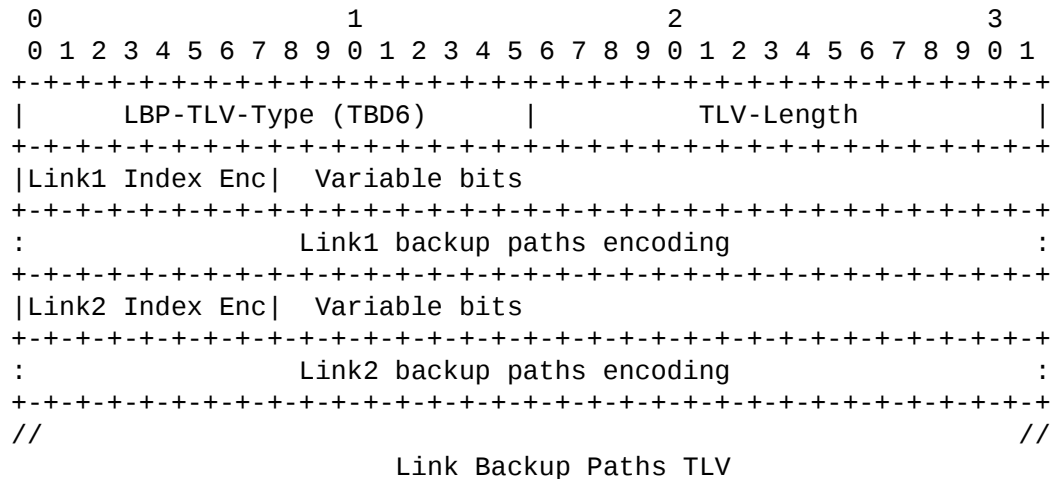
Backup paths for a link:

- link index encoding +
- link backup paths encoding



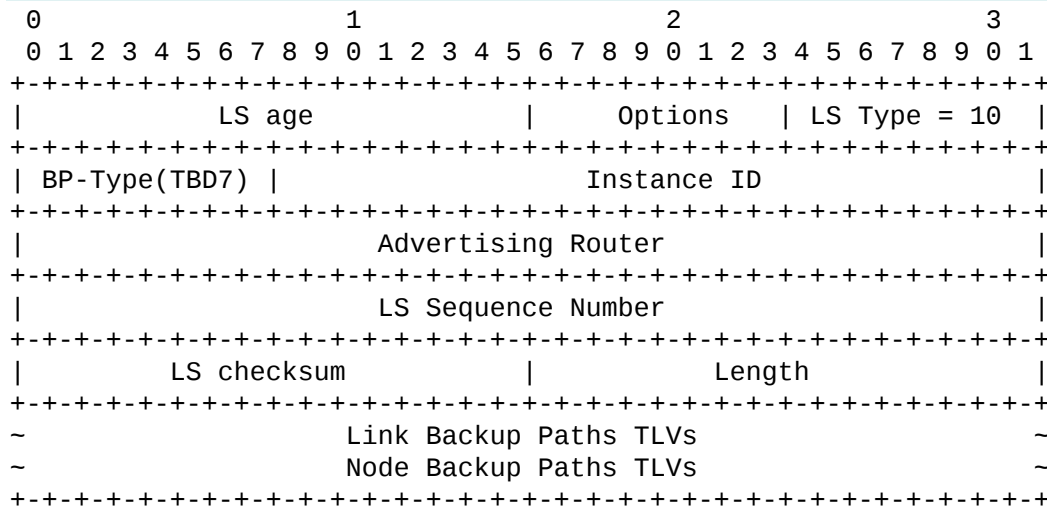
Link Backup Paths TLV:

- multiple links and their backup paths

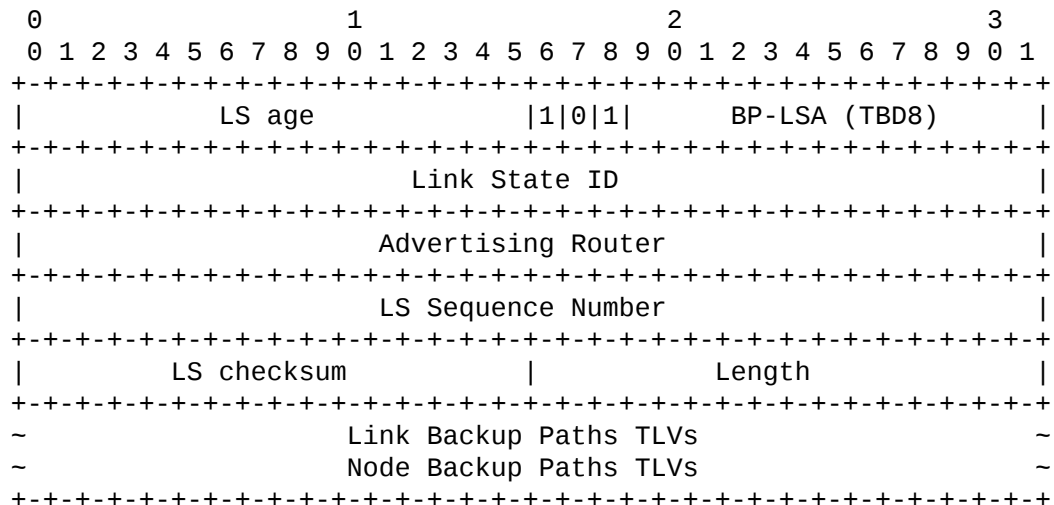


Encodings for Backup Paths: LSA

Backup paths Opaque LSA: node backup paths TLVs and link backup paths TLVs



OSPFv2: Backup Paths Opaque LSA



OSPFv3: Backup Paths LSA

Next Step

Welcome comments

Request for adoption