Advertising OTN Fixed Time slot constraints in OSPF
draft-vijay-ccamp-ospf-otn-timeslot-00.txt

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Abstract
This document describes the extensions needed to OSPF for advertising the constraints that exists in some OTN switches while switching timeslots between ports. This advertisement would be needed for computing path of LSP through these switches taking into account the above mentioned constraint.

This document proposes extensions to existing OSPF for advertising the timeslots available on each OTN port in a new sub-tlv and the connectivity matrix representing the capability of the device to cross connect these timeslots in another new sub-tlv

1. Introduction

In [RFC7138], a mechanism for advertising the ODU multiplexing hierarchy is described. In [RFC7580], an optical node property TLV is defined as an extension to the OSPF opaque LSA defined in [RFC3630].

This document describes the use of OSPF-TE in carrying information about the details of OTN time slots available in each port of an OTN switch and the connectivity matrix describing the connectivity between the timeslots of the different ports.

2. Terminology

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in RFC2119 [RFC2110].

The reader is assumed to be familiar with the terminology in RFC7138[RFC7138],RFC5780[RFC5780] and RFC3630(RFC3630)

3. OSPF Extensions

A new OTN timeslot sub-TLV and OTN Connectivity matrix sub-TLV are proposed in this document. The OTN timeslot sub-TLV will be used in conjunction with the SCSI described in section 4.1 of RFC7138[RFC7138]. The OTN connectivity matrix will be carried in the Optical node property TLV described in RFC7580[RFC7580]

3.1 OTN Timeslot sub-TLV

```
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
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|  Type (TBD)                  |            Length             |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

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Type

TBD

Length

Length of Sub-TLV

Pri

Priority level (0-7) at which the bitmap is advertised

G: Timeslot granularity

0 - 1.25 Gbps
1 -  2.5 Gbps
2 -  5 Gbps

Priority (0-7) at which the bitmap is available

Bitmap Length

Length in bits of the bitmap following this

BitMap

The bitmap represents the timeslots available which is advertised through this sub-TLB. A 1 in the bit position represents that the timeslot is available, while a 0 represents that the timeslot is not available. The Bitmap is padded to the nearest byte boundary.

3.2 Connectivity matrix sub-TLV
The Connectivity matrix TLV is described below.

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

<table>
<thead>
<tr>
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<th>Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Link pairs</td>
<td></td>
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<tr>
<td>Link Identifier</td>
<td></td>
</tr>
<tr>
<td>Link Identifier</td>
<td></td>
</tr>
<tr>
<td>Number of Bitmap pair pairs</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Bit Map Length</th>
<th>G</th>
<th>TimeSlot BitMap</th>
</tr>
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<tbody>
<tr>
<td>BitMap(contd)</td>
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</tr>
</tbody>
</table>

Type

TBD

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4. Operational overview

This section details the operation of the scheme proposed in this document.

On some OTN switches there exists constraints on which OTN timeslots can be cross connected to which other OTN timeslots. Therefore, the node computing the path through such switches needs to be aware of the OTN timeslots which are available and to which other timeslots they can be cross connected.

The OTN timeslot sub-TLV is advertised along with the SCSI defined in section 4.1 of RFC7138(RFC7138) as a separate sub-tlv of the link tlv. The SCSI in RFC7138(RFC7138) only advertises the number of timeslots available whereas this sub-TLV defines the exact timeslots which are available in the form a bitmap.
The connectivity matrix sub-TLV is advertised in the node attribute TLV of the opaque LSA defined in RFC3630 in line with the connectivity matrix that is advertised in [RFC7580]. This advertisement describes exactly which timeslots of an OTN interface can be cross connected to which other timeslots of another OTN Interface. For every pair of link identifiers, multiple pairs of bitmaps are advertised, this denotes that timeslots, of the first interface in the interface identifier pair, identified in the first bitmap of the bitmap pair can be cross connected to timeslots, of the second interface in the interface identifier pair, identified in the second bitmap of the bitmap pair. Like this several interface pairs and their corresponding bitmap pairs can be advertised.

For example, if on Interface I1 timeslots (t1,t3,t5) can be cross-connected to timeslots (t2,t4,t6) on Interface I2 and (t2,t4,t6) on Interface I1 can be cross-connected to (t1,t3,t5) on Interface I2, then there will be one interface Identifier pair (I1,I2) advertised with two bitmap pairs corresponding to (t1,t3,t5), (t2,t4,t6) and (t2,t4,t6), (t1,t3,t5).

The above mentioned sub-TLVs together would help the node which is computing the path to determine which timeslot to select on each of the OTN ports to route the LSP on OTN switches which have restriction on cross connecting OTN timeslots.

5. Interoperability Considerations

The feature described in this document would be operational only if all the OSPF routers in area support the extension described above.

6. Security considerations

None

7. IANA Considerations

IANA needs to allocate a new Type for the OTN timeslot sub-TLV described in section 3.1 and a new Type for the connectivity matrix sub-TLV described in section 3.2.

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9. References
9.1 Normative References


9.2 Informative references
