GMPLS Signaling Extensions for the Evolving G.709 OTN Control

CCAMP WG, IETF 82nd, Taipei, Taiwan

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Authors & Contributors
Changes from Version 00

- Added some text to describe new Switching Type in Generalized_Label_Request to make it consistent with [OTN-FWK] and [OTN-OSPF]

- Refined the descriptions about ODUflex formula including ODUflex(CBR) and ODUflex(GFP) in Traffic Parameters

- NMC field in Traffic Parameters has been deprecated and should be only used with RFC4328
Generalized Label Request

• **New Switching Type** for G.709v3 is introduced in [OTN-FWK] and [OTN-OSPF]

• **Generalized Label Request Object** also use this new Switching Type

<table>
<thead>
<tr>
<th>Value</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>Time-Division-Multiplex Capable (TDM) (RFC4328)</td>
</tr>
<tr>
<td>101 (TBA)</td>
<td>OTN-TDM capable (OTN-TDM)</td>
</tr>
</tbody>
</table>
Traffic Parameters of ODUflex

- **NMC:**
  - RFC4328: Indicate how many TS are requested for the LO ODUj
  - Redundant information (since signal type or bit-rate is known, the number of TS can be deduced)
  - May be different on different hops
  - Deprecated and is only used with RFC4328 for backwards compatibility reasons

- **Bit_Rate:**
  - Describe the bit rate for ODUflex (CBR) and ODUflex(GFP)

- **Tolerance:**
  - Describe the tolerance for ODUflex (CBR) (No need for ODUflex(GFP))
Traffic Parameters of ODUflex

- **ODUflex (CBR) Traffic Parameters**
  - The number of requested TS on HO ODUk link can be calculated by:

  \[
  N = \text{Ceiling of} \left( \frac{\text{ODUflex(CBR) nominal bit rate} \times (1 + \text{ODUflex(CBR) bit rate tolerance})}{\text{ODTUk.ts nominal bit rate} \times (1 - \text{HO OPUk bit rate tolerance})} \right)
  \]

  - ODUflex(CBR) bit rate is the client signal bit rate after applying the 239/238 factor and the transcoding factor T:

    \[
    \text{ODUflex(CBR) nominal bit rate} = \text{CBR client bit rate} \times \frac{239}{238} / T
    \]

- **ODUflex (GFP) Traffic Parameters**
  - G.709v3 Amd2 recommends that the ODUflex(GFP) will fill an integral number of tributary slots of the smallest HO ODUk path
  - Direct mapping between ODUflex (GFP) bit rate and number of requested TS

<table>
<thead>
<tr>
<th>ODU type</th>
<th>Nominal bit-rate</th>
<th>Tolerance</th>
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<tbody>
<tr>
<td>ODUflex(GFP) of n TS, 1&lt;=n&lt;=8</td>
<td>n * ODU2.ts</td>
<td>+/-100 ppm</td>
</tr>
<tr>
<td>ODUflex(GFP) of n TS, 9&lt;=n&lt;=32</td>
<td>n * ODU3.ts</td>
<td>+/-100 ppm</td>
</tr>
<tr>
<td>ODUflex(GFP) of n TS, 33&lt;=n&lt;=80</td>
<td>n * ODU4.ts</td>
<td>+/-100 ppm</td>
</tr>
</tbody>
</table>
Discussion: ODU FA-LSP Creation(1)

• When creating ODUk FA-LSP (further used for ODUj client signals), how to choose appropriate link supporting the ODUj client?

Therefore, the client hierarchy information (ODU1->ODU3) should be carried in the signaling to create this ODU3-FA, which will be used to carry ODU1.

Note: If the client hierarchy information is ODU0->ODUk, it also implies that TSG 1.25G must be selected.
Discussion: ODU FA-LSP Creation(2)

- TSG information:

TSG information is needed ONLY in case that AUTOpayloadtype is disabled in node B (AUTOpayloadtype =false), otherwise ODU1 does not care which TSG will be used (either 1.25G or 2.5G can be used) when AUTOpayloadtype =true.

Therefore, if auto-payload type is off, a further information related to TS granularity supported by the interface is needed, ie., when auto-payload = false, it needs TSG information to create ODUk (k=2,3) FA-LSP to carry ODUj(j<K &j!=0) besides the client hierarchy information.
Discussion: How to encode the info

• How to encode the client ODU signal type & TSG information?

<table>
<thead>
<tr>
<th>Candidate Solution</th>
<th>Reasons</th>
<th>Issues</th>
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</table>
| **Option 1:** Use G-PID to indicate the ODUj client & TSG | G-PID represents the adaption capability between the requested LSP and the client signal carried by that LSP | • Only for end points (not the penultimate node)  
• If the LSP will carry different types of LO ODUj signals, how to carry multiple G-PIDs? |
| **Option 2:** Use Encoding Type to indicate TSG | The "Encoding Type" represents the nature of the LSP which has end-to-end meaning | • Intermediated nodes need to process this info  
• How to indicate the LO ODUj client signal type of the FA-LSP?  
• A new Object may be still needed |
| **Option 3:** Use New Object to indicate the ODUj client & TSG | Since Option 1&2 are not good enough, it may be needed to introduce another new Object | • Define new rules for the processing of the new object |
Next Steps

• Figure out how to encode the needed information including client hierarchy information and TSG information when creating ODUk FA LSP for carrying LO ODUj client signals

• Refine it according to the feedback from the meeting or mailing list