ISIS Extensions for Flex Ethernet (FlexE)
draft-zcdc-isis-flexe-extension-01

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Flex Ethernet (FlexE) Overview

- By decoupling Ethernet MAC rate and PHY rate
  - FlexE can support a variety of Ethernet MAC rates that may or may not correspond to any existing Ethernet PHY rate

- FlexE has three major features
  - Bonding, bond Nx100GbE interfaces into a single pipe to form a larger and faster interface
  - Sub-rating, adapt Ethernet MAC rate to line rate, mainly for the case where the line rates in UNI and NNI are not matching
  - Channelization, within a PHY or a group of PHYs, e.g., supporting a 25G MAC, a 50G MAC and a 125G MAC to over two bonded 100GBASE PHYs

- FlexE introduces the “slot” concept
  - Based on a calendar, direct how to dispatch/map Ethernet flow onto corresponding slots
  - Each slot has a 5G granularity for now, more granularities may be supported (e.g., 25G)
FlexE Interface and Link

• A FlexE interface
  • Is a Nx100GBASE bonded Ethernet interfaces
  • Can be channelized into multiple sub-interfaces
• A FlexE link connects two FlexE interfaces
  • The big pipe
• A FlexE sub-link connects two FlexE sub-interfaces
  • The small pipes

A Use Case of FlexE – Network Slicing

- A FlexE link sliced into multiple FlexE sub-links as demand
- A set of FlexE sub-links allocated to a user/service to form a “sliced network” that has dedicated resources
- LSPs of the user/service can be established over their own sub-links
  - RSVP-TE signaling, or
  - Segment Routing
- Provide interface/link level isolation
Advertisement of FlexE Link and Sub-link

- FlexE Link, following new information needed
  - Granularity (e.g., 5G per slot)
  - Available slots

- FlexE Sub-link, two options
  - Each sub-link advertised as an individual link, need to
    - Configure IP address at two ends of the link
    - Enable routing protocols (e.g., OSPF or ISIS) on each link
  - Sub-link advertised as a member of a “bundle”
    - No need to configure IP address and enable routing protocols for each link
    - More scalable
# ISIS Extensions for FlexE Link Advertisement

### Interface Switching Capability Descriptor (ISCD) sub-TLV

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<tr>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
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<tbody>
<tr>
<td>Switching Cap</td>
<td>Encoding</td>
<td>Reserved</td>
<td></td>
</tr>
</tbody>
</table>

- Max LSP Bandwidth at priority 0
- Max LSP Bandwidth at priority 1
- Max LSP Bandwidth at priority 2
- Max LSP Bandwidth at priority 3
- Max LSP Bandwidth at priority 4
- Max LSP Bandwidth at priority 5
- Max LSP Bandwidth at priority 6
- Max LSP Bandwidth at priority 7

### FlexE Interface sub-TLV

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<table>
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<tr>
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<tbody>
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<tr>
<td>Available Slots at priority 7</td>
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</tbody>
</table>
Next steps

• WG review and feedbacks
• FlexE sub-link advertisement optimization and enhancement
  • Support Network slicing (interface/link based) and Segment Routing
Thanks