Composite Link
Requirements

draft-so-yong-mpls-ctg-requirement-00.txt

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Differences between this and prior version

Split the framework and Requirement draft into two drafts based on the group feedback from 75th IETF

- Requirements – composite link motivation/problem statement, and transport and operation requirements
- Framework – architecture of composite link and transport method, and applicability
Definitions From Framework Draft (Revised)

- Composite link consists a set of component links that have the same end points.
- Component links may have different TE parameters
- Composite link can carry LSP traffic and control plane packets
- LSP traffic flows and CP packets first is mapped into a connection, then connections are mapped to a component link
- Traffic volume measurement on a per connection basis
  - enable bandwidth optimization over composite link
  - makes the measurement scalable and manageable
- Traffic mapping and connection mapping algorithm takes traffic and connection parameters into account

Interior Functions: Data/forwarding, determination of component link.
Management Control of these functions important for interoperability.

Exterior Functions: Routing and Signaling
Traffic Flow Taxonomy

Definition of Traffic Flow Types in terms of Routing and Signaling Functions Exterior to the Composite Link

<table>
<thead>
<tr>
<th>Traffic Flows</th>
<th>IGP</th>
<th>IGP-TE</th>
<th>RSVP-TE</th>
<th>LDP</th>
</tr>
</thead>
<tbody>
<tr>
<td>With TE Info</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>Without TE Info</td>
<td>Y</td>
<td>N</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td>With &amp; Without TE Info</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
</tbody>
</table>
Revised Requirements Outline

- **Management/Measurement of Interior Functions**
  - Functions common to all LSP flows
  - Functions specific to LSP flows with TE information
  - Functions specific to LSP flows without TE information
  - Sets of LSP flows with and without TE information

- **Exterior Functions**
  - Functions common to all LSP flows
  - Functions specific to LSP flows with TE information
  - Functions specific to LSP flows without TE information
  - Sets of LSP flows with and without TE information

- **Requirements from previous combine requirements-framework-02 draft mapped into this outline**
  - Some new requirements added
4.1 Management of Interior Functions

- 4.1.1. Functions common to all LSP flows
  - 4.1.1.1. Traffic Flow and CTG Mapping
  - 4.1.1.2. Management of Other Operational Aspects
    - 4.1.1.2.1. Resilience
    - 4.1.1.2.2. OAM Messaging Support
    - 4.1.1.2.3. Flow/Connection Mapping Change Frequency
- 4.1.2. Functions specific to LSP flows with TE information
- 4.1.3. Functions specific to LSP flows without TE information
- 4.1.4. Sets of LSP flows with and without TE information
  - 4.1.4.1. Handling Bandwidth Shortage Events
Bandwidth Shortage Events

“Bandwidth Shortage" can occur if sum of total bandwidth for LSPs (mapped to connections) with provisioned/signaled TE information (RSVP-TE) and those signaled (LDP) without TE information (but with measured bandwidth) exceeds composite link bandwidth.

Policy-based preemption capability using signaled or configured preemption and holding parameters required at connection level:

- Connection with RSVP-TE LSPs, signal LSP preemption
  - Soft preemption (i.e., notify LSP source prior to preemption) desirable
- Use some to-be-specified method to notify LDP signaled LSPs that the connection has been pre-empted
- Non-re-routable RSVP-TE LSPs or non-releasable LDP labels, signal that LSP is disconnected
4.2 Exterior Functions

- Routing and Signaling Functions are exterior to composition link
  - Functions common to all LSP flows
  - Functions specific to LSP flows with TE information
  - Functions specific to LSP flows without TE information
  - Sets of LSP flows with and without TE information
4.2.1 Functions Common to All LSP Flows

- 4.2.1.1 Signaling Protocol Extensions
  - Signal composite link between routers
  - Signal component link as part of composite link
  - Automatically inject composite link into IGP
- 4.2.1.2 Router Advertisement Extensions
  - Identify adjacency as composite link
- 4.2.1.3 Multi-Layer Networking Aspects
  - Use GMPLS/MPLS-TP control plane signaled component link parameters
    - Maximum acceptable latency
    - Actual (estimated or measured) latency
    - Bandwidth
    - Delay variation (desirable)
    - Loss Rate (desirable)
  - Derive advertised (composite link) interface parameters from above signaled component link parameters
4.2.2. Functions specific to LSP flows with TE information

4.2.2.1. Signaling Protocol Extensions
- Mandatory additional LSP signaling parameters
  - Maximum acceptable latency
  - Actual (estimated or measured) accumulated latency based upon the actual component link assigned by the composite link
  - Bandwidth of the highest and lowest speed component link traversed
- Desirable additional LSP signaling parameters
  - Delay Variation
  - Loss Rate

4.2.2.2. Routing Advertisement Extensions
- Represent multiple values for component links
  - Actual (estimated or measured) Latency
  - Capacity
- For example, if a range of latencies is used, CSPF can use this to prune certain composite links, but signaling provides feedback on actual accumulated latency against the signaled maximum latency
- Solution should consider use of OSPF QoS Routing [RFC 2676].
4.2.3. Functions for LSP flows without TE information

- Intent is NOT to recreate RSVP-TE functions for LDP [RFC 3468].
- Objective is functions more localized and simpler than RSVP-TE since many operators use LDP.

4.2.3.1 Signaling Protocol Extensions
- Signal allowed measured capacity to nodes adjacent to composite link endpoints.

4.2.3.2. Routing Advertisement Extensions
- Advertise capacity allocated to LDP flows on the composite link.
4.2.4. Functions for LSP flows with and without TE information

- RSVP-TE LSP flows support preemption, but LDP currently does not except by changing IGP metric

- 4.2.4.1 Signaling Protocol Extensions
  - Indication via composite link head end node to preempt specific LDP LSP

- 4.2.4.2 Routing Advertisement Extensions
  - Indication that all LDP-sigaled traffic should avoid specified composite link
Next Steps

Agreement on requirements/ framework separation, scope and overall structure.

Adopt framework and requirement drafts as WG drafts
- Draft-so-yong-mpls-CTG-framework-00
- Draft-so-yong-mpls-CTG-requirement-00

Determine how best to organize this work and assign to appropriate working group(s).

Acknowledgements
Co-Authors like to thank Adrian F., Lou B., Kireeti K., Eric Gray, Dmitri P., and other for reviews and suggestions