

*Composite Transport Group (CTG)
Framework and Requirements*
draft-so-yong-mpls-ctg-framework-requirement-02.txt

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Differences between version 1 and version 2

- New author is added
 - Yuji Kamite from NTT
- Acknowledgements
 - Significant inputs from Adrian Farrel. Also inputs from Kireeti Kompella and Lou Berger.
- Major rewrite of Motivation/Problem Statement
 - Removed detail in appendices
- Removal of implementation dependent material in framework/requirements
- Reorganization of requirements
 - Separate Section 5 for single and Section 6 for multiple routing instances
 - Separate subsections for Interior and Exterior functions

Differences between version 1 and version 2

⊕ Major rewrite of Motivation

- ⊠ ECMP/Hashing/LAG not using MPLS control information may be suboptimal.
- ⊠ Advertisement of component link characteristics not scalable, and not all required parameters (e.g., latency) are currently supported.
- ⊠ Response time and performance of centralized planning tool may not be acceptable.
- ⊠ In multi-layer network, a lower layer may alter characteristics of component link (e.g., latency) and create significant operational impact

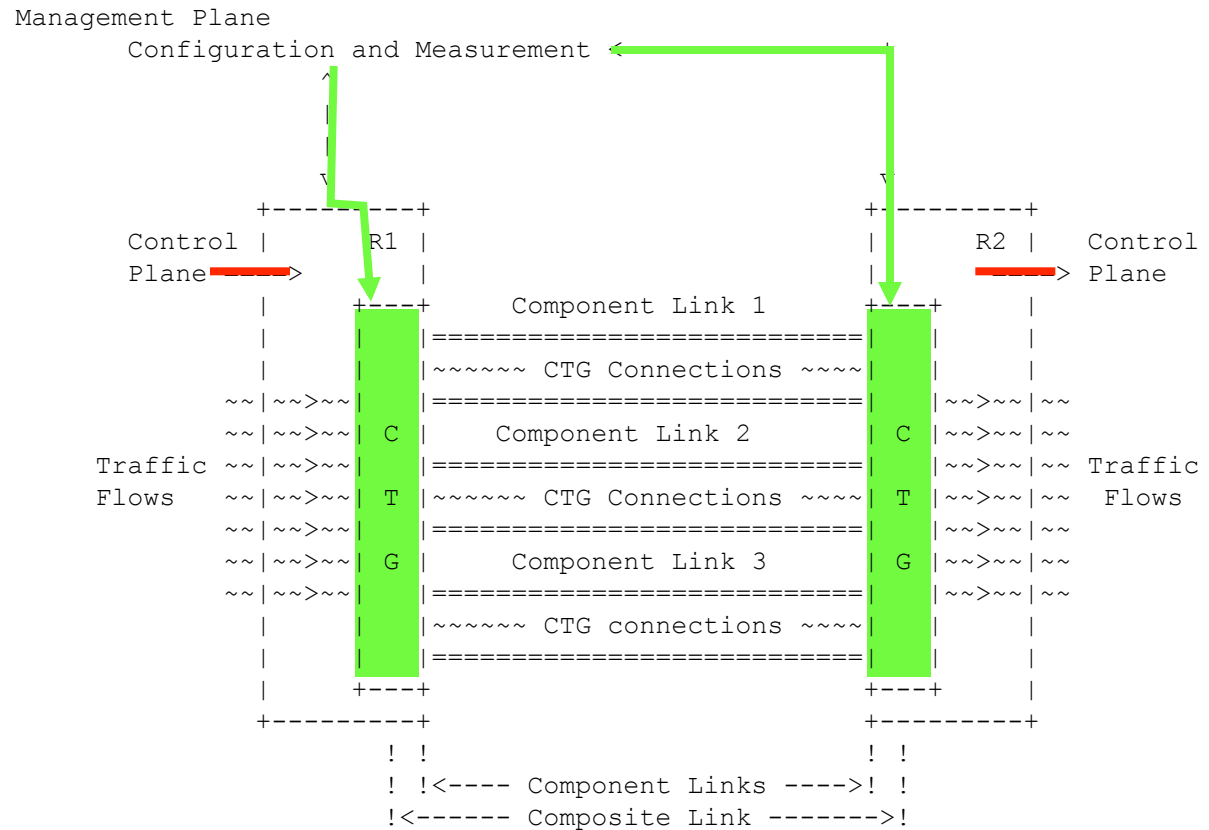
⊕ Major rewrite of Problem Statement



- ⊠ Transport both RSVP-TE and LDP signaled non-TE LSPs on same composite link while maintaining acceptable service quality for both.
- ⊠ Extend link bundling type function to groups of links having different characteristics (e.g., bandwidth, latency).
- ⊠ Need to be able to signal CTG of required, desired, and acceptable link characteristics (e.g., latency, optimization frequency) for each CTG hop in the path.
- ⊠ Support sets of component links across intermediate nodes at same and/or lower layers where the characteristics (e.g., latency) of said links may change dynamically (e.g., due to restoration).
- ⊠ Support arbitration between multiple CTG client routing instances in the event of bandwidth shortages.

CTG Base Framework (Revised)

Clarification Text Added

Instead of simply mapping the incoming traffic flows directly to the component links, aggregating multiple flows into a connection makes the measurement of actual bandwidth usage more scalable and manageable.



-  Interior Functions: Data/forwarding, determination of component link. Management Control of these functions important for interoperability.
-  Exterior Functions: Routing and Signaling

CTG Multiple Routing Instances (Revised)

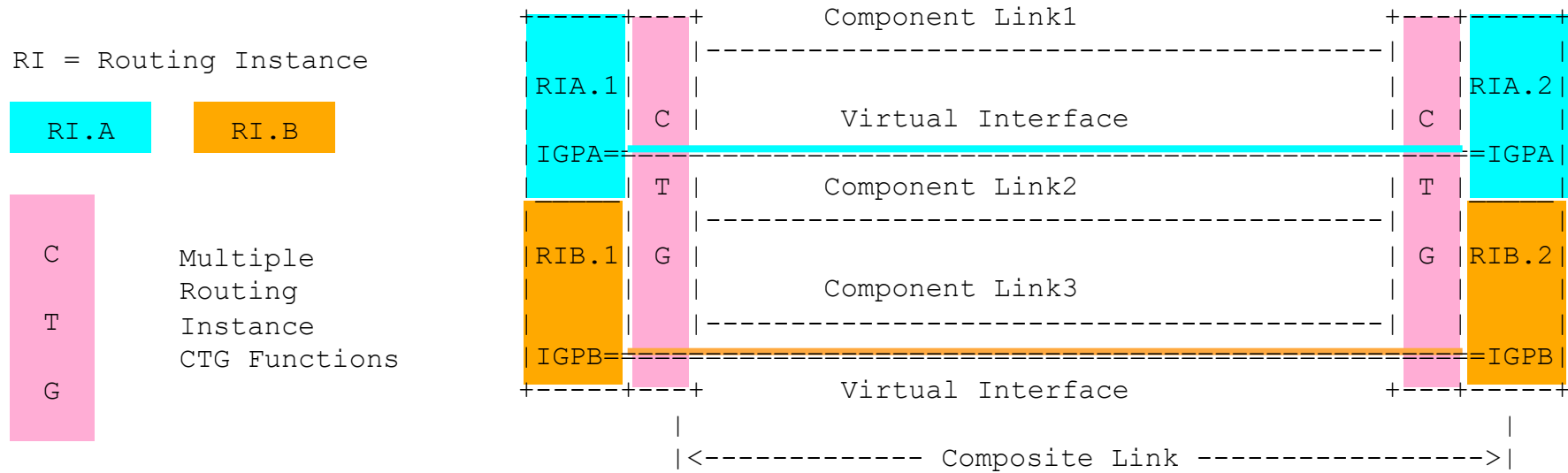


Figure 3: Routing Instances Sharing Composite Link

Clarification Text

Operationally desirable for efficiency reasons for lower-level routing instances to share composite link resources via a higher level CTG control logic to allocate resources amongst the lower-level instances based upon configured policy and the current state of component links.

These CTG functions provide dynamic allocation of component link resources via a virtual interface to each of the multiple routing instances. Operational scenarios in response to certain failure scenarios and/or load conditions where the multi-routing instance CTG function may preempt certain LSPs and/or cause changes in the routing information communicated by the IGPs.

Requirements Sections (Revised Outline)

- 5. CTG Requirements for a Single Routing Instance
 - 5.1. Management and Measurement of CTG Interior Functions
 - 5.1.1. Configuration as a Routable Virtual Interface
 - 5.1.2. Traffic Flow and CTG Mapping
 - 5.1.2.1. Using Control Plane TE Information
 - 5.1.2.2. When no TE Information is Available (i.e., LDP)
 - 5.1.2.3. Handling Bandwidth Shortage Events
 - 5.1.3. Management of Other Operational Aspects
 - 5.1.3.1. Resilience
 - 5.1.3.2. Flow/Connection Mapping Change Frequency
 - 5.1.3.3. OAM Messaging Support
 - 5.2. CTG Exterior Functions
 - 5.2.1. Signaling Protocol Extensions
 - 5.2.2. Routing Advertisement Extensions
 - 5.2.3. Multi-Layer Networking Aspects
- 6. CTG Requirements for Multiple Routing Instances
 - 6.1. Management and Measurement of CTG Interior Functions
 - 6.1.1. Appearance as Multiple Routable Virtual Interfaces
 - 6.1.2. Control of Resource Allocation
 - 6.1.3. Configuration of Prioritization and Preemption
 - 6.2. CTG Exterior Functions
 - 6.2.1. CTG Operation as a Higher-Level Routing Instance

Single Routing Instance Exterior Functions

❁ 5.2.1 Signaling Protocol Extensions

- ❁ SHALL signal component link as part of composite link
- ❁ SHALL signal composite link and automatically inject into IGP
- ❁ SHALL signal additional parameters
 - Min/max (estimated or measured) latency
 - Bandwidth of highest/lowest speed component link
- ❁ SHOULD signal additional parameters
 - Delay variation
 - Loss rate

Single Routing Instance Exterior Functions

✿ 5.2.2 Routing Advertisement Extensions

- ✿ SHALL represent multiple values or a range of values
 - e.g., a range of latencies

✿ 5.2.3 Multi-Layer Networking Aspects

- ✿ SHALL support derivation of advertised interface parameters from signaled component link parameters from a lower layer (e.g., latency) based on operator policy.

Multiple Routing Instance Exterior Functions

❁ 6.2.1 CTG Operation as a Higher-Level Routing Instance

- ❁ SHALL be able to advertise parameters such as reserved capacity, measured capacity usage and allocatable resources for the CTGs of which they perform CTG interior functions.
- ❁ SHALL be able to signal and respond to requests for a change in allocation of the CTG interior function resources.

Next Steps

- ⊕ Agreement on framework, scope and overall structure.
- ⊕ Determine how best to organize this work and assign to appropriate working group(s).