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Vishnu Pavan Beeram (Ed)
Juniper Networks
Igor Bryskin (Ed)
ADVA Optical Networking

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Shared Resource Link Group (SRcLG)
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Status of this Memo

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Abstract

This document introduces the concept of SRcLG ("Shared Resource Link Group") and discusses its usage in the context of mutually exclusive Virtual TE Links.

Conventions used in this document

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 RFC-2119 [RFC2119].

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1. Introduction

A Virtual TE Link (as defined in [RFC6001]) advertised into a Client Network Domain represents a potentiality to setup an LSP in the Server Network Domain to support the advertised TE link. The Virtual TE Link gets advertised like any other TE link and follows the same rules that are defined for the advertising, processing and use of regular TE links [RFC4202]. However, "mutual exclusivity" is one attribute that is specific to Virtual TE Links.

[DRAFT-MELG] discusses the different types of mutual exclusivity (Static vs Dynamic) that come into play, explains the need to advertise this information into the Client TE Domain and introduces a new TE construct (MELG) to carry static mutual exclusivity information.

This document is a companion document to [DRAFT-MELG]. It discusses "Dynamic Mutual Exclusivity" in detail and introduces a new TE construct (SRcLG) to carry dynamic mutual exclusivity information.

2. Dynamic Mutual Exclusivity

As discussed in [DRAFT-MELG], this type of mutual exclusivity exists temporarily within a given network configuration. It comes into play when two or more Virtual TE Links depend on the usage of the same shareable underlying server network domain resource. Mutual Exclusivity exists when the amount of the said server resource that is available for sharing is limited temporarily; it ceases to exist when sufficient amount of the resource is available for accommodating all corresponding Virtual TE Links.

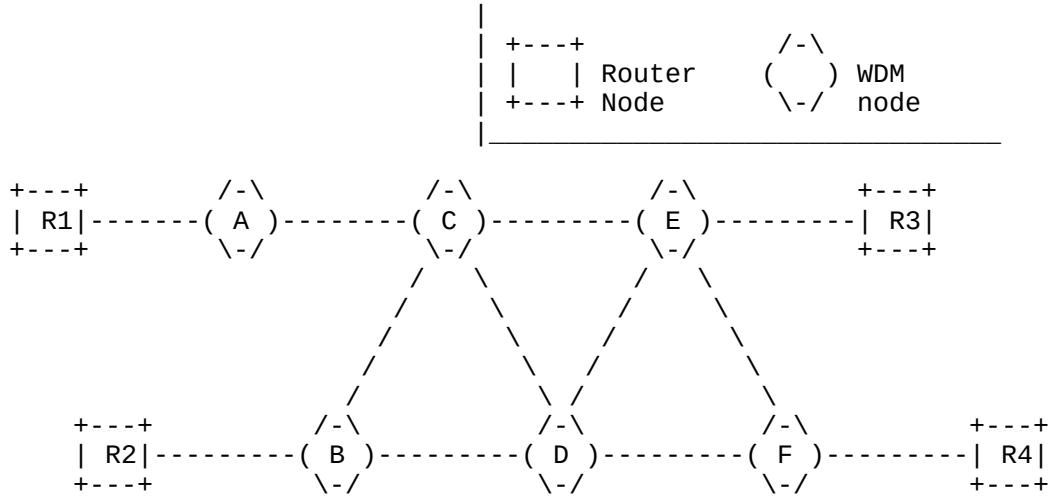


Figure 1a: Sample topology

Consider the network topology depicted in Figure 1a. This is a typical packet optical transport deployment scenario where the WDM layer network domain serves as a Server Network Domain providing transport connectivity to the packet layer network Domain (Client Network Domain).

Nodes R1, R2, R3 and R4 are IP routers that are connected to an Optical WDM transport network. A, B, C, D, E and F are WDM nodes

that constitute the Server Network Domain. The border nodes (A, B, E and F) operate in both the server and client domains. Figure 1b depicts how the Client Network Domain TE topology looks like when there are no Client TE Links provisioned across the optical domain.

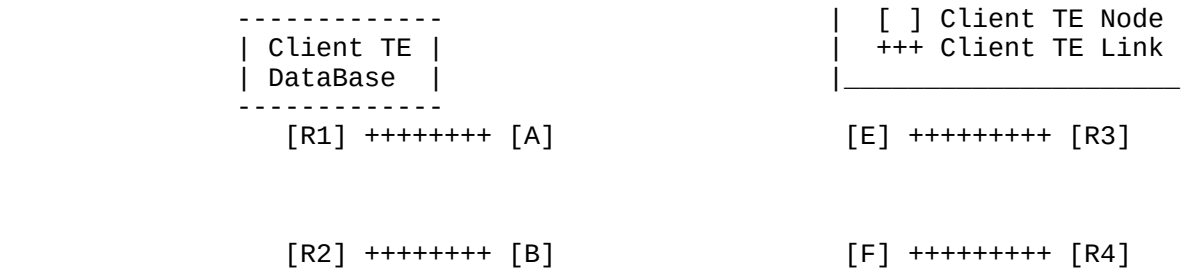


Figure 1b: Client TE Database

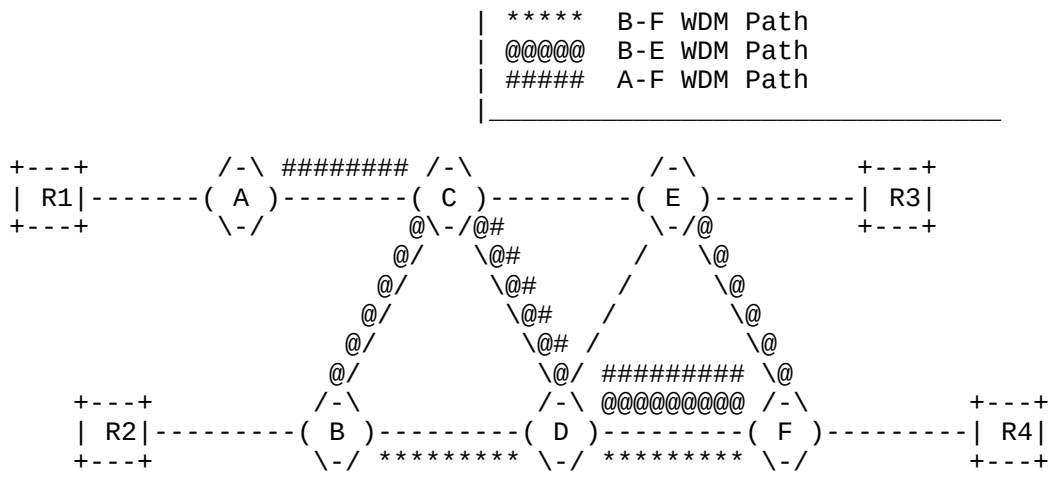


Figure 2a: Mutually Exclusive potential WDM paths

Now consider augmenting the Client TE topology by creating three Virtual TE Links across the optical domain. The potential paths in the WDM network catering to these three virtual TE links are as

shown in Fig 2a and the corresponding augmented Client TE topology is as illustrated in Fig 2b.

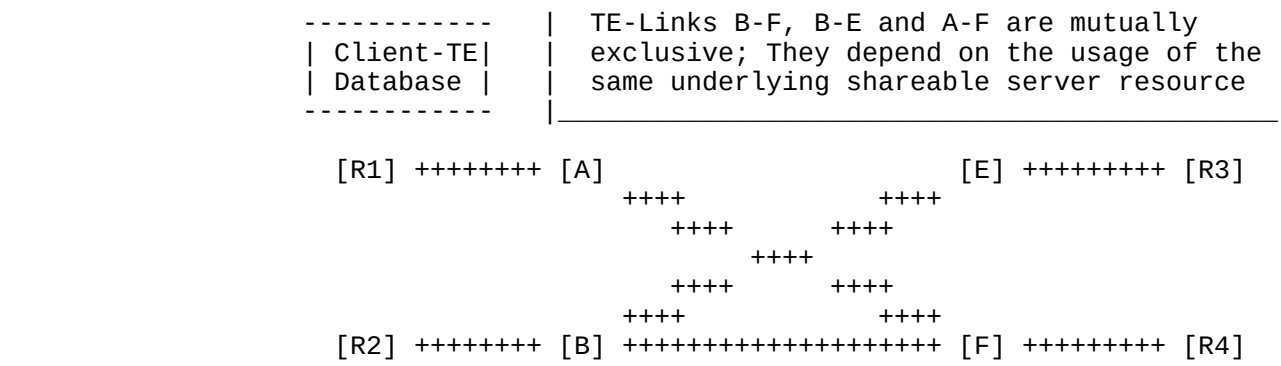


Figure 2b: Client TE Database - Mutually Exclusive Virtual TE Links

In this particular example, all three potential paths traverse through the WDM-Link {D-F}. Now assume that this link has only 2 lambda channels available. Also assume that any available lambda can get picked for each of these 3 corresponding underlying server LSPs. This means that only two out of the three Virtual TE Links can get committed at the moment. This dynamic mutual exclusivity ceases to exist when a third lambda channel becomes available on the WDM-link {D-F}.

This document proposes the use of "Shared Resource Link Group (SRcLG)" for catering to this scenario.

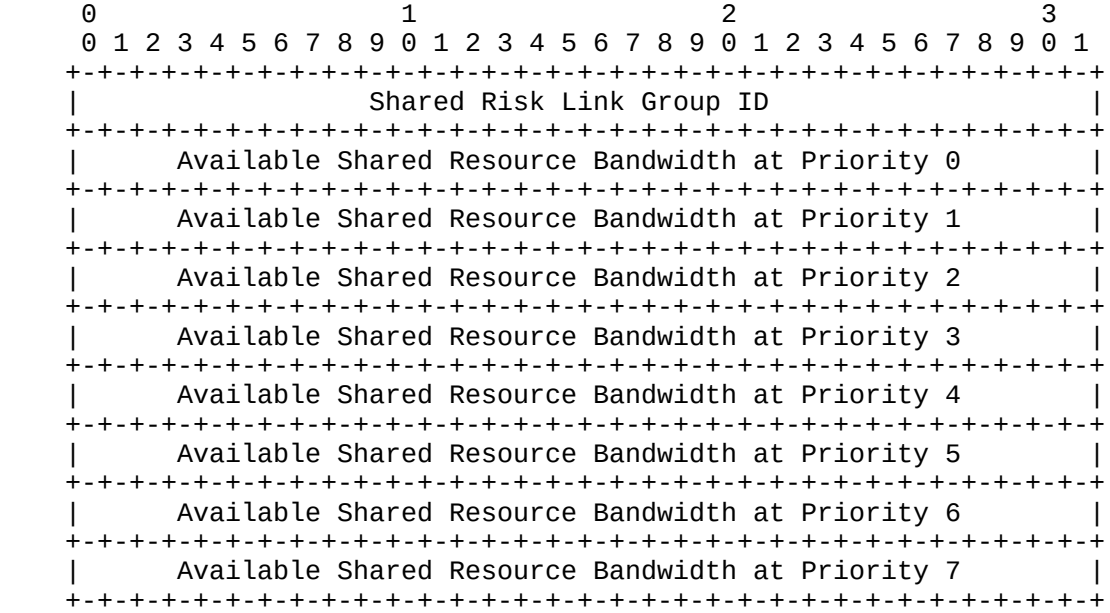
3. Shared Resource Link Group (SRcLG)

SRLG (Shared Risk Link Group - [RFC4202]) represents a set of links that share a resource whose failure may affect all links in the set. Since dynamic mutual exclusivity comes into play when the underlying server resource is shareable, all corresponding Virtual TE-Links would belong to the same SRLG. This document introduces the notion of a "Shared Resource Link Group (SRcLG)", which is meaningful only in the context of Virtual TE Links. SRcLG represents a set of Virtual TE-links that depend on the usage of a shared server-layer

resource that has a variable bandwidth capacity and as a result may sometimes not be able to simultaneously accommodate all corresponding Virtual TE-Links in the set. As is the case with SRLGs, a given Virtual TE Link may belong to multiple SRcLGs.

3.1. Construct

In terms of the TE construct that gets advertised, an SRcLG is nothing but an SRLG with some additional information to help determine which and how many of the corresponding virtual TE Links can get committed simultaneously. This additional information is the per-priority available shared resource bandwidth associated with a given SRLG. Since an SRcLG cannot exist without the presence of a corresponding SRLG, the SRcLG is identified by the corresponding 32-bit SRLG-ID. In other words, the SRcLG-ID is the same as the identifier of the SRLG it represents.



The SRcLG information advertised into the Client TE Domain is an unordered list of SRcLGs present in a given Virtual Topology. Unlike the SRLG construct or the MELG construct, the SRcLG construct does not get advertised per TE-Link. This is because the information carried in this construct is quite dynamic in nature and advertising it per TE-Link poses serious scaling concerns.

3.2. Advertising Rules

As far as the advertisement of a Virtual TE-Link is concerned, there is no perceived difference between SRLG and SRcLG. The 32-bit IDs of all SRcLGs that a Virtual TE-Link belongs to are advertised via the SRLG contruct. Additionally, all SRcLG information associated with a given Virtual Topology is advertised into the Client TE Domain by the provider of the Virtual Topology. It is the responsibility of this provider to keep the bandwidth availability information for each SRcLG current with timely updates. The draft envisions that one or more server domain OSPF/ISIS TE speakers will be tasked to provide these timely updates. This TE speaker may advertise all SRcLG information (that it is responsible for) in the same OSPF-LSA/ISIS-LSP or advertise each SRcLG TLV separately - one in each OSPF-LSA/ISIS-LSP.

3.3. Processing Rules

The intended consumer of this SRcLG information is the PCE in the Client TE Domain. The Client PCE should take this advertised information into account when performing path selection for services over the Virtual Topology provided by the network domain. In particular, this information should be used when deciding how many Virtual TE links could be accomodated simultaneously on a given SRcLG at a given priority level.

4. Security Considerations

TBD

5. IANA Considerations

TBD

6. Normative References

[RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", BCP 14, RFC 2119, March 1997.

[RFC4202] K.Kompella, Y.Rekhter, "Routing Extensions in Support of Generalized Multi-Protocol Label Switching (GMPLS)", RFC4202, October 2005.

[RFC6001] D.Papadimitriou, M.Vigoureax, K.Shiomoto, D.Brungard

and JL. Le Roux, "GMPLS Protocol Extensions for Multi-Layer and Multi-Region Networks", RFC 6001, October 2010.

[DRAFT-MELG] Beeram, V., "Mutual Exclusive Shared Link Group", draft-beeram-ccamp-melg, October 2013

7. Acknowledgments

TBD

Authors' Addresses

Vishnu Pavan Beeram
Juniper Networks
Email: vbeeram@juniper.net

Igor Bryskin
ADVA Optical Networking
Email: ibryskin@advaoptical.com

Cyril Margaria
Email: cyril.margaria@gmail.com

Fatai Zhang
Huawei Technologies
Email: zhangfatai@huawei.com