INTERNET-DRAFT
Intended Status: Standard Track

Expires: January 11, 2014

Khuzema Pithewan
Rajan Rao
Infinera

July 10, 2013

OSPF-TE extensions for MLNMRN based on OTN
draft-rao-ccamp-mlnmrn-otn-ospfte-ext-02.txt

Abstract

This document specifies OSPF extensions for multi-layer/multi-region where one of the regions is OTN.

Status of this Memo

This Internet-Draft is submitted to IETF in full conformance with the provisions of BCP 78 and BCP 79.

Internet-Drafts are working documents of the Internet Engineering Task Force (IETF), its areas, and its working groups. Note that other groups may also distribute working documents as Internet-Drafts.

Internet-Drafts are draft documents valid for a maximum of six months and may be updated, replaced, or obsoleted by other documents at any time. It is inappropriate to use Internet-Drafts as reference material or to cite them other than as "work in progress."

The list of current Internet-Drafts can be accessed at http://www.ietf.org/1id-abstracts.html

The list of Internet-Draft Shadow Directories can be accessed at http://www.ietf.org/shadow.html

Copyright and License Notice

Table of Contents

1 Introduction

This document specifies the OSPF extensions required to work in multi-region networks involving OTN. The specification is based on the requirement as specified in RFC 5212. As per the said RFC, ISCD characterizes the information associated to one or more network layers. Same RFC also says that the information about the adjustment capabilities of the nodes in the network allow the path computation process to select an end-to-end multi-layer or multi- region path that includes links with different switching capabilities joined by LSRs that can adapt (i.e., adjust) the signal between the links. By inference, information about the adjustment capabilities should be able to identify a layer in ISCD, if ISCD specifies more than one layer.

RFC6001 specifies how to advertise adjustment capabilities between two switching regions. IACD definition has provision to extend it for a specific technology through Adjustment Capability Specific information (ACSI) field, if required. ACSI field can be used to identify a layer in the multi-layer ISCD. OTN being defined as multi-layer ISCD, the corresponding IACD needs to be extended to be able to carry layer identification so as to enable multi-layer/multi-region path computation. similar to OTN, legacy SONET/SDH also has fixed multiplexing hierarchy. Adaptation layer in SONET/SDH hierarchy requires identification information in ACSI, in order to adapt SONET/SDH signal to OTN and vice versa.

If the interface does not support de-multiplexing, then layer identification is not required. Hence, Layer ID sub-TLV is optional.

2. OTN Layer Identification

[GMPLS-OTN-OSPF] defines attributes that identifies a layer in multi-layer OTN ISCD. These attributes are part of Bandwidth sub-TLV in Switch capability specific information of ISCD. These attributes are

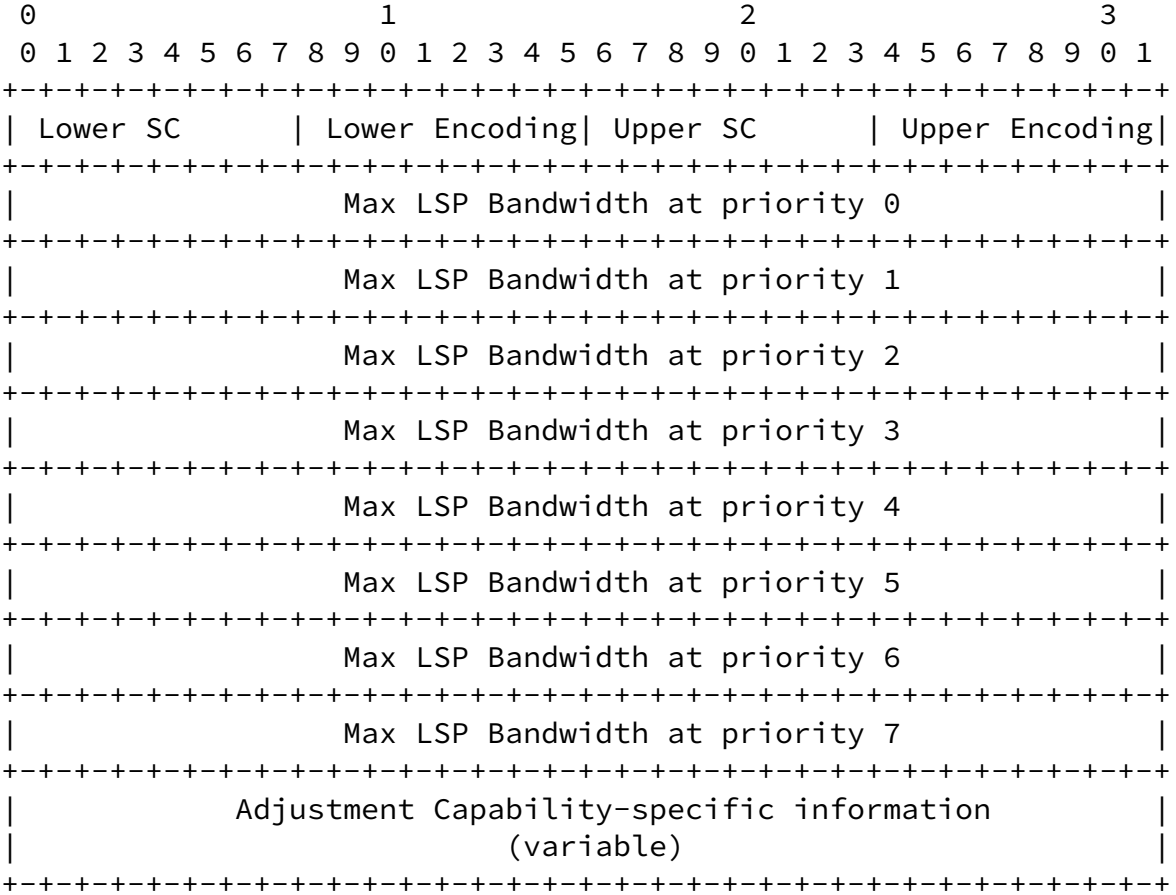
reproduced here for completeness sake.

* Signal Type: Layer for which bandwidth is being advertised.
* Hierarchy : also called as multiplexing branch that specifies all the layers between server layer and signal type.
* TSG : Time Slot Granularity

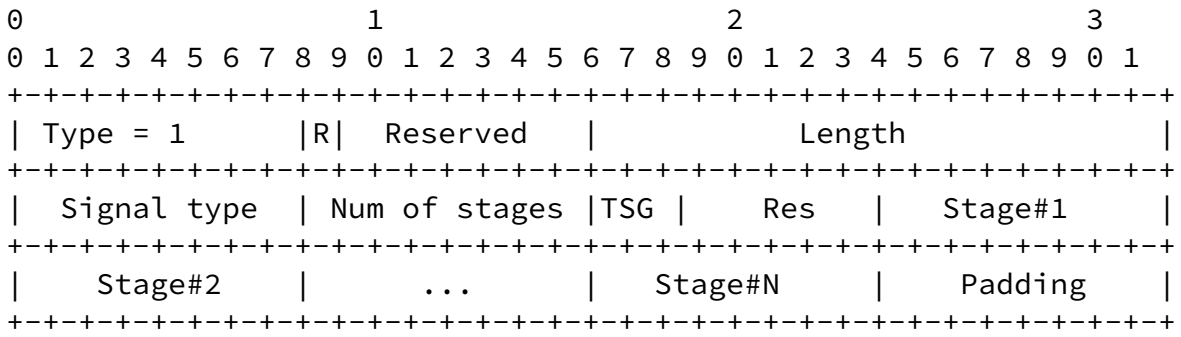
Absence of this sub-TLV for OTN means that the OTN ISCD doesn't support multiplexing.

3. Interface Adjustment Capability Extensions for OTN

RFC6001 defines IACD sub-TLV as follows. Please refer to the RFC for definition of individual fields of the sub-TLV.



Adjustment Capability-specific information abbreviated as ACSI henceforth for OTN G.709v3 carries LayerID Sub-TLV which is defined as follows



The definition & meaning of fields used in the above sub-TLV is same

as in bandwidth sub-TLV of ISCD as defined in [GMPLS-OTN-OSPF]. This LayerID sub-TLV is applicable only when one of the regions is OTN, which means either lower or upper SC and Encoding type MUST have Switch Cap as OTN-TDM and encoding type as G.709 ODUk.

R bit is used to make sense whether the Layer ID is for Lower region or upper region. 1 means upper region and 0 means lower.

The 8 priorities of the BW as defined in main IACD structure, is adjustment capability between the two regions where one of the region is identifies by LayerID sub-TLV.

4. SONET/SDH Layer Identification

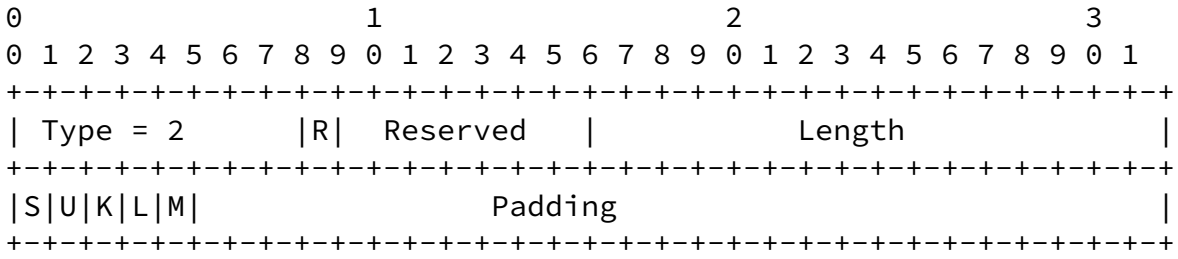
G.707 defines the structure of SDH multiplexing hierarchy and RFC 4606 defines generalized label structure needed to fully specify SONET/SDH multiplexing hierarchy. This Label structure also referred as SUKLM structure identifies all the layers of the multiplexing hierarchy along with time slots. For the purpose of this draft, only layer identification is needed, hence each layer can be identified by a bit. Bit value 1 signifies presence of the layer and 0, its absence. 5 Bits, each representing one layer is sufficient to fully

identify the SONET/SDH multiplexing hierarchy.

Absence of sub-TLV means that the SONET/SDH ISCD doesn't support multiplexing and needs only transparent mapping to other Interface.

5. Interface Adjustment Capability Extensions for SONET/SDH

Layer ID sub TLV for SONET/SDH is defined as follows



SUKLM bits signifies the presence of SONET/SDH layers and these bits together fully specifies the multiplexing hierarchy. Refer to Section 3 of RFC 4606 for full specification of SUKLM bits.

6 Procedure

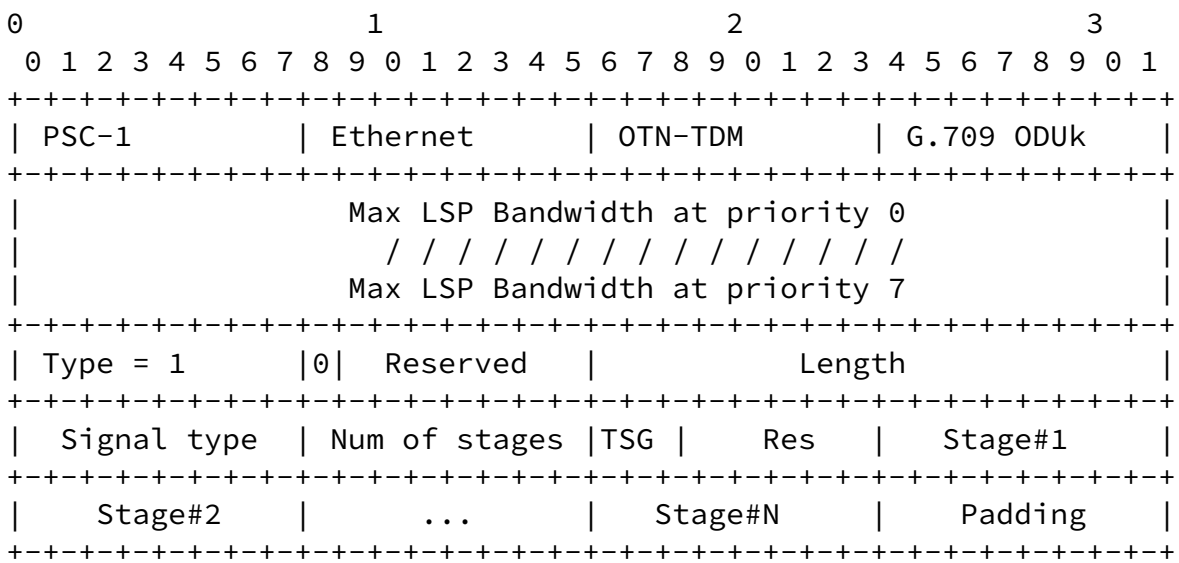
A node advertising IACD for the bandwidth between regions where one or both of them are hierarchical i.e. OTN or SONET/SDH, MUST include the Layer ID sub-TLV as part of ACSI as defined above.

For multi-region path computation, the path computing node MUST look at the LayerID sub-TLV (in ACSI part of IACD) if lower/upper {SC,Enc] is {OTN-TDM,G.709ODUk} or {TDM,SONET/SDH} to identify the layer for correct layer for BW check.

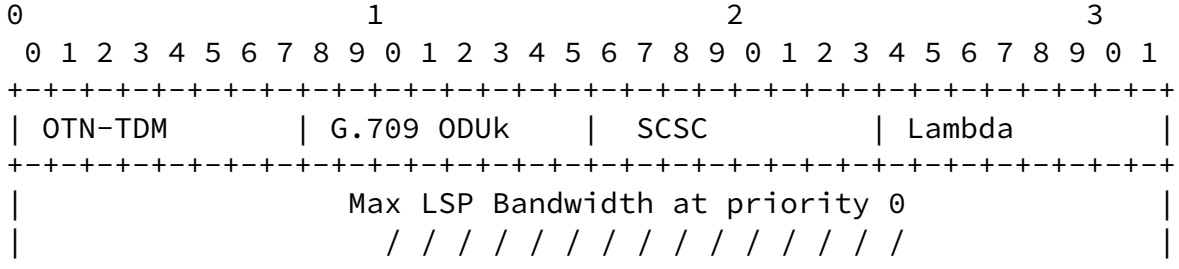
7 Examples

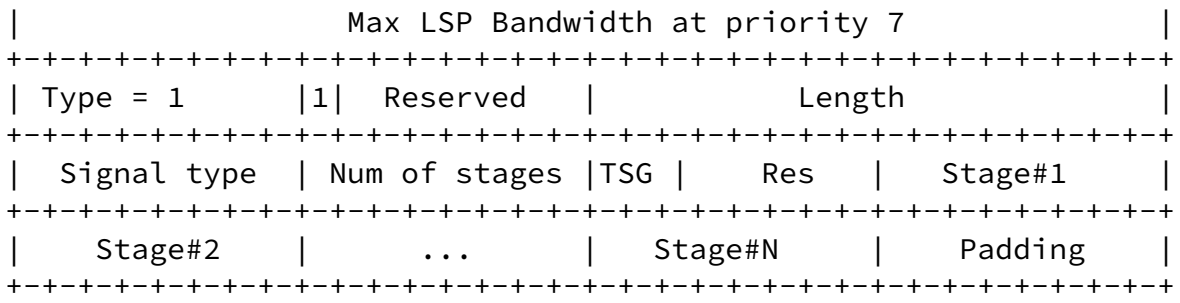
This section exemplifies TLV values for various technology region combinations, where one of the region is OTN

a. Ethernet and OTN When upper region is Ethernet and lower region is OTN

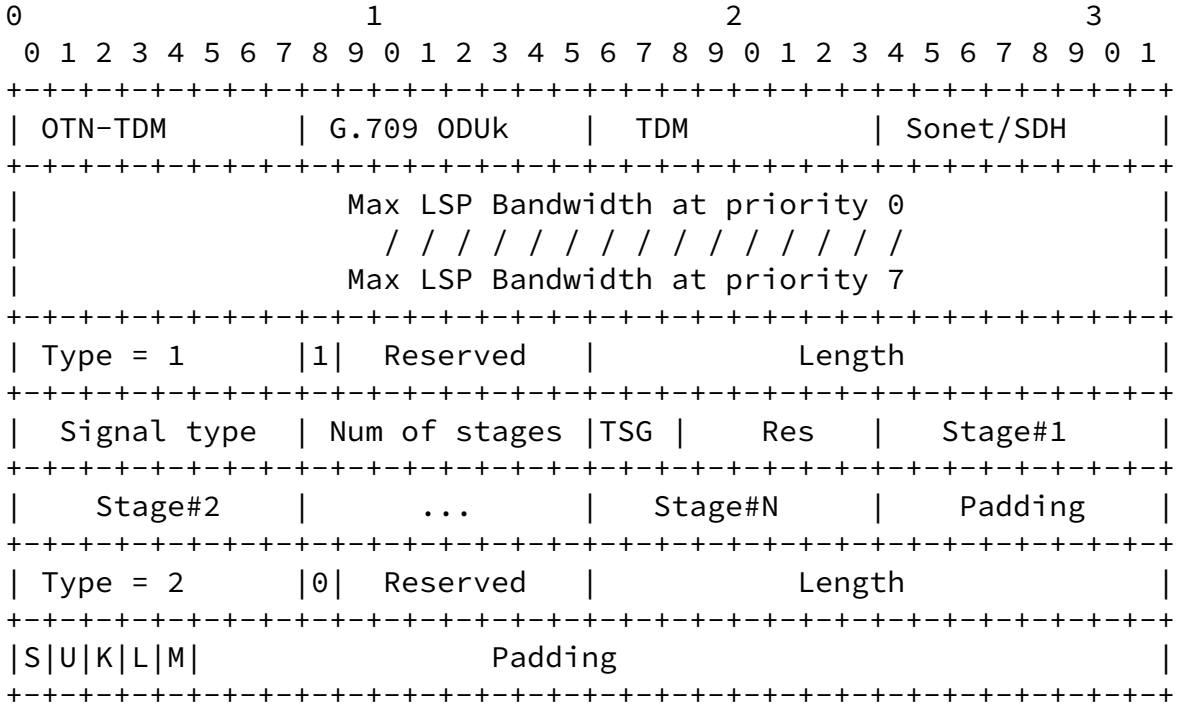


b. OTN and FlexChannel

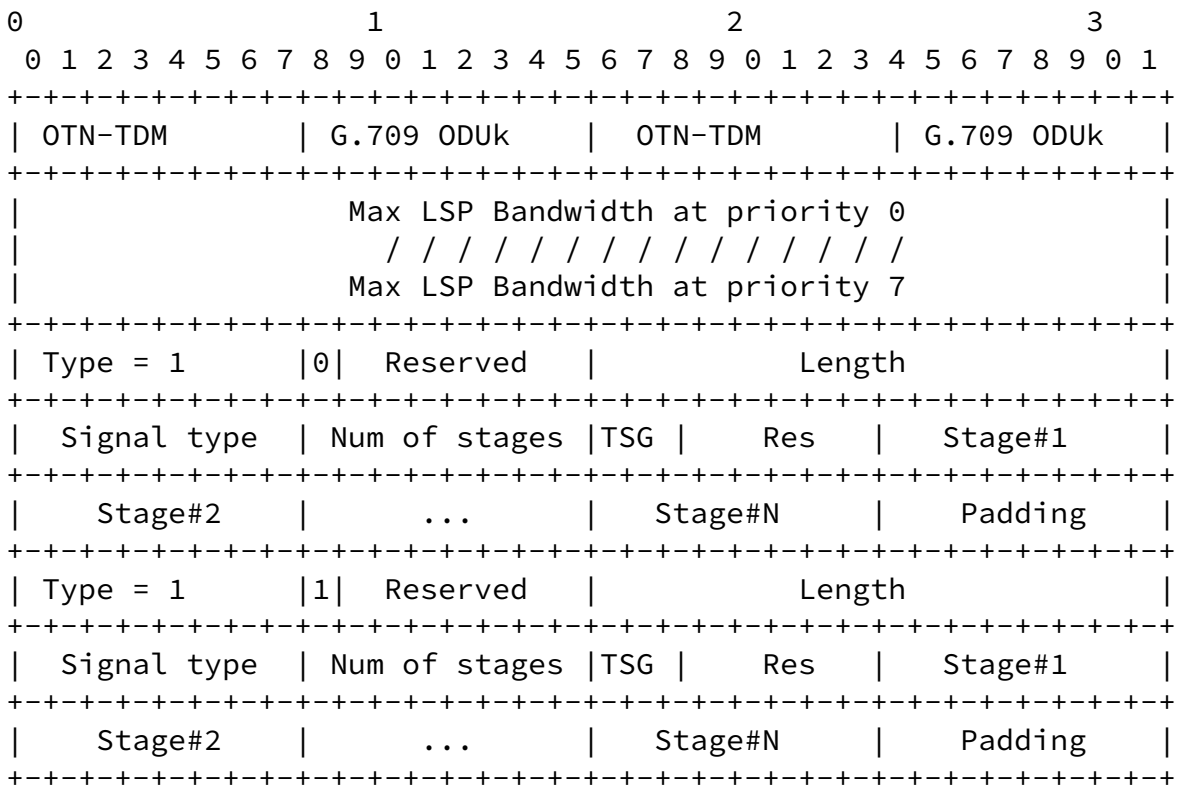




c. OTN and SONET/SDH



d. OTN and OTN



8 IANA Considerations

TBD

9 Security Considerations

TBD

10 References

[RFC5212] K. Shiomoto, Papadimitriou, D.,JL. Le Roux, Vigoureux, M., Brungard, D., "Requirements for GMPLS-Based Multi-Layer and Multi-Region Networks (MLN/ MRN)",RFC 5212, July 2008.

[RFC6001] Papadimitriou, D., Vigoureux, M., Shiomoto, K., Brungard, D., and JL. Le Roux, "Generalized MPLS (GMPLS) Protocol Extensions for Multi-Layer and Multi-Region Networks (MLN/MRN)", RFC 6001, October 2010.

[RFC4606] E. Mannie, Perceval, D. Papadimitriou, "Generalized Multi-Protocol Label Switching (GMPLS) Extensions for Synchronous Optical Network (SONET) and Synchronous Digital Hierarchy (SDH) Control", RFC 4606, Aug 2006

11 Authors' Addresses

Khuzema Pithewan
Infinera
140 Caspian Ct., Sunnyvale, CA 94089
Email: kpithewan@infinera.com

Rajan Rao
Infinera
140 Caspian Ct., Sunnyvale, CA 94089
Email: rrao@infinera.com