

Network Working Group  
Internet Draft  
Intended status: Standards Track

H. Long  
M.Ye  
Huawei Technologies Co., Ltd  
G. Mirsky  
Ericsson  
A Alessandro  
Telecom Italia S.p.A  
October 18, 2013

Expires: April 2014

OSPF Routing Extension for Links with Variable Discrete Bandwidth  
draft-long-ccamp-ospf-availability-extension-01.txt

Abstract

Packet switching network may contain links with variable discrete bandwidth, e.g., copper, radio, etc. The bandwidth of such link may change discretely in reaction to changing external environment. Availability is typically used for describing such links during network planning. This document describes an extension for OSPF routing for route computation in a Packet Switched Network (PSN) which contains links with variable discrete bandwidth by introducing an optional availability sub-TLV.

Status of this Memo

This Internet-Draft is submitted 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/ietf/lid-abstracts.txt>

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

This Internet-Draft will expire on April 18, 2014.

## Copyright Notice

Copyright (c) 2013 IETF Trust and the persons identified as the document authors. All rights reserved.

This document is subject to BCP 78 and the IETF Trust's Legal Provisions Relating to IETF Documents (<http://trustee.ietf.org/license-info>) in effect on the date of publication of this document. Please review these documents carefully, as they describe your rights and restrictions with respect to this document. Code Components extracted from this document must include Simplified BSD License text as described in Section 4.e of the Trust Legal Provisions and are provided without warranty as described in the Simplified BSD License.

## Table of Contents

1. Introduction .....	3
2. Overview .....	3
3. Extension to OSPF Routing Protocol.....	4
3.1. Interface Switching Capacity Descriptor.....	4
3.2. ISCD Availability sub-TLV.....	5
3.3. Signaling Process.....	6
4. Security Considerations.....	6
5. IANA Considerations .....	6
6. References .....	6
6.1. Normative References.....	6
6.2. Informative References.....	7
7. Acknowledgments .....	7

## 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].

The following acronyms are used in this draft:

OSPF	Open Shortest Path First
PSN	Packet Switched Network
SNR	Signal-to-noise Ratio
LSP	Label Switched Path
ISCD	Interface Switching Capacity Descriptor

PE        Provider Edge

LSA       Link State Advertisement

## 1. Introduction

Some data communication technologies allow seamless change of maximum physical bandwidth through a set of known discrete values. For example, in mobile backhaul network, microwave links are very popular for providing connection of last hops. In case of heavy rain, to maintain the link connectivity, the microwave link may lower the modulation level since demodulating lower modulation level need lower signal-to-noise ratio (SNR). This is called adaptive modulation technology [EN 302 217]. However, lower modulation level also means lower link bandwidth. When link bandwidth reduced because of modulation down-shifting, high priority traffic can be maintained, while lower priority traffic is dropped. Similarly the copper links may change their effective link bandwidth due to external interference.

The parameter, availability [G.827, F.1703, P.530], is often used to describe the link capacity during network planning. Assigning different availability classes to different types of service over such kind of links provides more efficient planning of link capacity. To set up an LSP across these links, availability information is required for the nodes to verify bandwidth satisfaction and make bandwidth reservation. The availability information should be inherited from the availability requirements of the services expected to be carried on the LSP, voice service usually needs "five nines" availability, while non-real time services may adequately perform at four or three nines availability.

For the route computation, the availability information should be provided along with bandwidth resource information. In this document, an extension on Interface Switching Capacity Descriptor (ISCD) [RFC4202] for availability information is defined to support in routing signaling. The extension reuses the reserved field in the ISCD and also introduces an optional availability sub-TLV.

If there is a hop that cannot support the availability sub-TLV, the availability sub-TLV is ignored.

## 2. Overview

A node which has link(s) with variable bandwidth attached SHOULD contain a <bandwidth, availability> information list in its OSPF TE LSA messages. The list provides the information that how much

bandwidth a link can support for a specified availability. This information is used for path calculation by the PE node(s).

To setup an label switching path (LSP), a PE node may collect link information which is spread in OSPF TE LSA message by network nodes to get know about the network topology, and calculate out an LSP route based on the network topology, and send the calculated LSP route to signaling to initiate a PATH/RESV message for setting up the LSP.

### 3. Extension to OSPF Routing Protocol

#### 3.1. Interface Switching Capacity Descriptor

The Interface Switching Capacity Descriptor (ISCD) sub-TLV [RFC 4203] has the following format:

0										1										2										3									
0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1								
Type										Length																													
Switching Cap										Encoding										AI										Reserved									
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																																							
Switching Capacity-specific Information																																							
(variable)																																							

Type: 0x15, 16 bits;

Length: 16 bits;

Switching Cap: 8 bits

Encoding: 8 bits

See [RFC4203] section 1.4.

AI: ISCD Availability sub-TLV index, 8 bits

This new field is the index of availability sub-TLV for this ISCD sub-TLV.

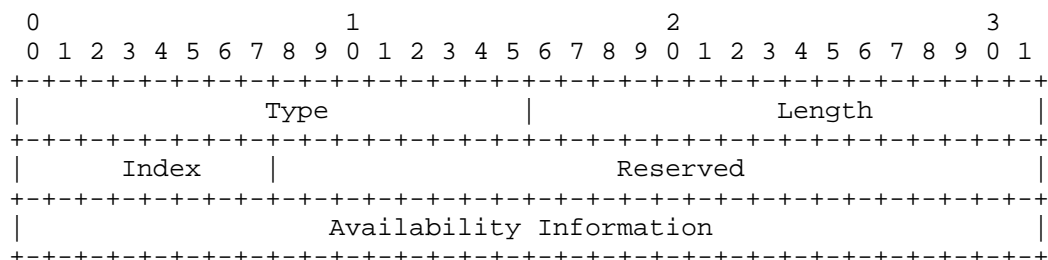
Maximum LSP Bandwidth: 32 bits

Switching Capability specific information: variable

See [RFC4203] section 1.4.

### 3.2. ISCD Availability sub-TLV

The availability sub-TLV has the following format:



Type: 0x01, 16 bits;

Length: 16 bits;

Index: 8 bits

This field is the index of this availability sub-TLV, referred by the AI field of the ISCD sub-TLV.

Availability Information: 32 bits

This field is a 32-bit IEEE floating point number which describes the availability guarantee of the switching capacity in the ISCD object which has the AI value equal to Index of this sub-TLV. The value must be less than 1.

### 3.3. Signaling Process

A node which has link(s) with variable bandwidth attached SHOULD contain one or more ISCD Availability sub-TLVs in its OSPF TE LSA messages. Each ISCD Availability sub-TLV provides the information that how much bandwidth a link can support for a specified availability. This information is used for path calculation by the PE node(s).

## 4. Security Considerations

This document does not introduce new security considerations to the existing OSPF protocol.

## 5. IANA Considerations

This document introduces an Availability sub-TLV of the ISCD sub-TLV of the TE Link TLV in the TE Opaque LSA for OSPF v2. This document proposes a suggested value for the Availability sub-TLV; it is recommended that the suggested value be granted by IANA. Initial values are as follows:

Type	Length	Format	Description
---	----	-----	-----
0	-	Reserved	Reserved value
0x01	8	see Section 3.2	Availability sub-TLV

## 6. References

### 6.1. Normative References

- [RFC2210] Wroclawski, J., "The Use of RSVP with IETF Integrated Services", RFC 2210, September 1997.
- [RFC3209] Awduche, D., Berger, L., Gan, D., Li, T., Srinivasan, V., and G. Swallow, "RSVP-TE: Extensions to RSVP for LSP Tunnels", RFC 3209, December 2001.
- [RFC3473] Berger, L., "Generalized Multi-Protocol Label Switching (GMPLS) Signaling Resource ReserVation Protocol-Traffic Engineering (RSVP-TE) Extensions", RFC 3473, January 2003.

- [RFC4202] Kompella, K. and Rekhter, Y. (Editors), "Routing Extensions in Support of Generalized Multi-Protocol Label Switching (GMPLS)", RFC 4202, October 2005.
- [RFC4203] Kompella, K., Ed., and Y. Rekhter, Ed., "OSPF Extensions in Support of Generalized Multi-Protocol Label Switching (GMPLS)", RFC 4203, October 2005.
- [G.827] ITU-T Recommendation, "Availability performance parameters and objectives for end-to-end international constant bit-rate digital paths", September, 2003.
- [F.1703] ITU-R Recommendation, "Availability objectives for real digital fixed wireless links used in 27 500 km hypothetical reference paths and connections", January, 2005.
- [P.530] ITU-R Recommendation, "Propagation data and prediction methods required for the design of terrestrial line-of-sight systems", February, 2012
- [EN 302 217] ETSI standard, "Fixed Radio Systems; Characteristics and requirements for point-to-point equipment and antennas", April, 2009

## 6.2. Informative References

- [MCOS] Minei, I., Gan, D., Kompella, K., and X. Li, "Extensions for Differentiated Services-aware Traffic Engineered LSPs", Work in Progress, June 2006.

## 7. Acknowledgments

Authors' Addresses

Hao Long  
Huawei Technologies Co., Ltd.  
No.1899, Xiyuan Avenue, Hi-tech Western District  
Chengdu 611731, P.R.China

Phone: +86-18615778750  
Email: longhao@huawei.com

Min Ye  
Huawei Technologies Co., Ltd.  
No.1899, Xiyuan Avenue, Hi-tech Western District  
Chengdu 611731, P.R.China

Email: amy.yemin@huawei.com

Greg Mirsky  
Ericsson

Email: gregory.mirsky@ericsson.com

Alessandro D'Alessandro  
Telecom Italia S.p.A

Email: alessandro.dalessandro@telecomitalia.it



