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# "EXP field" renamed to "CoS Field"
# draft-ietf-mpls-cosfield-def-02.txt

## Status of this Memo

Abstract

The early MPLS documents defined the form of a the MPLS Label Stack entry. This include a three bit field called the "EXP field". The exact use of this field was not defined by these documents, except to state that it is to be "reserved for experimental use".

Although the intended use of the EXP field was as a "Class of Service" field, it was not named the "Class of Service" (CoS) field by these early documents because the use of such a CoS field was not considered to be sufficiently defined. Today a number of standards documents define its usage as a CoS field. .

To avoid misunderstanding about how this field may be used this document re-introduces the name "CoS field" for this field. In doing so it also updates documents that define the current usee of the EXP this field.

Table of Contents

## 1. Introduction

The format of a MPLS label stack entry is defined by RFC 3032 [RFC3032], includes three bit field called "EXP field". The exact use of this field is not defined by RFC 3032 leaves,, except to state that it is to be "reserved for experimental use".

The EXP field, from the start, was intended to carry "Class of Service" information, the field was actually called the "Class of Service field" in the early versions of the working group document that was publshed as RFC 3032. However at the time that RFC 3032 was published the exact usage of this "Class of Service" field was not agreed and the field was designated as "Experimental use".

The designation "for Experimental use" has lead other Standards Development Organizations (SDO) and implementors to the assume that it possible to use the field for other purposes than Class of Service. This document changes the name of the field to clearly indicate its use.

The use of the EXP field was first defined in RFC 3270 [RFC3270] where a method to define a variant of DiffServ LSPs called EXP-Inferred-PSC LSP (E-LSPs) were specified.

The use of the EXP field as defined in RFC 3270 has been further extended in RFC 5129 [RFC5129], where methods for explicit congestion marking in MPLS are defined.

The defintions of how the EXP field are used are perfectly clear in

RFC 3270 and RFC 5129. However, these RFCs do not explicitly state they update 3032, and it is not captured in the RFC respository. This document updates RFC 3032, RFC 3270 and RFC 5129 to clarify the intended usage of the CoS field.

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].





## 2. Details of change

The three RFCs are now updated according to the following.

### 2.1. RFC 3032

The RFC 3032 states on page 3:

> 3. Experimental Use
>
> This three-bit field is reserved for experimental use.

This paragraph is now changed to:

> 3. Class of Service (CoS) field
>
> This three-bit field is used to carry Class of Service information and the change of the name is applicable to all places it occurs in IETF RFCs and other IETF documents.
>
> The definition of how to use the CoS field has been updated by RFC 3270 and RFC 5129.

## 2.2. RFC 3270

RFC 3270 says on page 6:

1.2 EXP-Inferred-PSC LSPs (E-LSP)

> A single LSP can be used to support one or more OAs. Such LSPs can support up to eight BAs of a given FEC, regardless of how many OAs these BAs span. With such LSPs, the EXP field of the MPLS Shim Header is used by the LSR to determine the PHB to be applied to the packet. This includes both the PSC and the drop preference.
>
> We refer to such LSPs as "EXP-inferred-PSC LSPs" (E-LSP), since the PSC of a packet transported on this LSP depends on the EXP field value for that packet.
>
> The mapping from the EXP field to the PHB (i.e., to PSC and drop precedence) for a given such LSP, is either explicitly signaled at label set-up or relies on a pre-configured mapping.
>
> Detailed operations of E-LSPs are specified in section 3 below.

Section 1.2 on page 5 in RFC 3270 is now changed to:





1.2 EXP-Inferred-PSC LSPs (E-LSP)

> The EXP field has been renamed to the CoS field, and thus all references in RFC 3270 to EXP field SHOULD be taken to refer to the CoS field. However, we retain the term E-LSP (EXP-Inferred-PSC LSP) as it is in widespread use.
>
> A single LSP can be used to support one or more OAs. Such LSPs can support up to eight BAs of a given FEC, regardless of how many OAs these BAs span. With such LSPs, the CoS field of the MPLS Shim Header is used by the LSR to determine the PHB to be applied to the packet. This includes both the PSC and the drop preference.
>
> We refer to such LSPs as "EXP-inferred-PSC LSPs" (E-LSP), since

the PSC of a packet transported on this LSP depends on the CoS field (previously called the EXP field) value for that packet.

The mapping from the CoS field to the PHB (i.e., to PSC and drop precedence) for a given such LSP, is either explicitly signaled at label set-up or relies on a pre-configured mapping.

This is an update to RFC 3032 [RFC3032] in line with the original intent of how this field in the MPLS Shim Header should be used (as CoS field). The RFC 3270 has itself been updated by RFC 5129 [RFC5129].

Detailed operations of E-LSPs are specified in section 3 of RFC3270.

## 2.3. RFC 5129

Section 2 (bullet 3) on page 6 of RFC 5129 says:

o A third possible approach was suggested by [Shayman]. In this scheme, interior LSRs assume that the endpoints are ECN-capable, but this assumption is checked when the final label is popped. If an interior LSR has marked ECN in the EXP field of the shim header, but the IP header says the endpoints are not ECN-capable, the edge router (or penultimate router, if using penultimate hop popping) drops the packet. We recommend this scheme, which we call `per-domain ECT checking', and define it more precisely in the following section. Its chief drawback is that it can cause packets to be forwarded after encountering congestion only to be dropped at the egress of the MPLS domain. The rationale for this decision is given in Section 8.1.

RFC 5219 is now updated like this:





A new paragraph is added at the end of section 1.1 "Background":

The EXP field has been renamed to the CoS field, and thus all references in RFC 5219 to EXP field SHOULD be taken to refer to the CoS field.

Section 2 (bullet 3) on page 6 ofis now changed to:

- A third possible approach was suggested by [Shayman]. In this scheme, interior LSRs assume that the endpoints are ECN-capable, but this assumption is checked when the final label is popped. If an interior LSR has marked ECN in the CoS field of the shim header, but the IP header says the endpoints are not CoS-capable, the edge router (or penultimate router, if using penultimate hop popping) drops the packet. We recommend this scheme, which we call `per-domain ECT checking', and define it more precisely in the following section. Its chief drawback is that it can cause packets to be forwarded after encountering congestion only to be dropped at the egress of the MPLS domain. The rationale for this decision is given in Section 8.1. This scheme is an update to RFC 3032 [RFC3032] and RFC 3270 [RFC3270].





## 3. Use of the CoS field

Due to the limited number of bits the particular use of the bits is intended to be flexible - including the definition of various QoS and ECN functions.

Current implementations look at the CoS field with and without label context and the CoS field may be copied to the labels that are pushed onto the label stack.  This is to avoid the pushed labels having a different CoS field.

CoS and ECN funtions may rewrite all or some of the bits.

## 4. IANA considerations

There are no request for IANA allocation of code points in this document.

## 5. Security considerations

This document only changes the name of one field in the MPLS Shim Header and thus does not introduce any new security considerations.

## 6. Acknowledgments

The author would like to thank Stewart Bryant, Bruce Davie, George Swallow, and Francois Le Faucheur for their input to and review of the current document.

The author also like to thanks George Swallow, Khatri Paresh and Phil Bedard for their help with grammar and spelling.

# 7. References

## 7.1. Normative References

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

[RFC3032] Rosen, E., Tappan, D., Fedorkow, G., Rekhter, Y., Farinacci, D., Li, T., and A. Conta, "MPLS Label Stack Encoding", RFC 3032, January 2001.

[RFC3270] Le Faucheur, F., Wu, L., Davie, B., Davari, S., Vaananen, P., Krishnan, R., Cheval, P., and J. Heinanen, "Multi-Protocol Label Switching (MPLS) Support of Differentiated Services", RFC 3270, May 2002.

[RFC5129] Davie, B., Briscoe, B., and J. Tay, "Explicit Congestion Marking in MPLS", RFC 5129, January 2008.

## 7.2. Informative references

[Shayman] Shayman, M. and R. Jaeger, University of Michigan, "Using ECN to Signal Congestion Within an MPLS Domain", Work in Progress, November 2000.", <http://www.watersprings.org/pub/id/draft-shayman-mpls-ecn-00.txt/>.

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