

Network Working Group

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## **Definitions of Textual Conventions and OBJECT-IDENTITIES for Multi-Protocol Label Switching Management**

[draft-nadeau-mpls-tc-mib-00.txt](#)

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## [1.](#) Abstract

**This memo describes Textual Conventions and OBJECT-IDENTITIES used for managing MPLS networks.**

## [2.](#) Introduction

This memo defines a portion of the Management Information Base (MIB) for use with network management protocols in the Internet community. In particular, it defines Textual Conventions used in IETF MPLS and MPLS-related MIBs.

Comments should be made directly to the MPLS mailing list at [mpls@uu.net](mailto:mpls@uu.net).

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](#), reference [[BCP14](#)].

For an introduction to the concepts of MPLS, see [[MPLSArch](#)].

## [3.](#) Terminology

This document uses terminology from the document describing the MPLS architecture [[MPLSArch](#)].

## [4.](#) The SNMP Management Framework

The SNMP Management Framework presently consists of five major components:

- o An overall architecture, described in [RFC 2571](#) [[RFC2571](#)].
- o Mechanisms for describing and naming objects and events for the purpose of management. The first version of this Structure of Management Information (SMI) is called SMIV1 and described in STD 16, [RFC 1155](#) [[RFC1155](#)], STD 16, [RFC 1212](#) [[RFC1212](#)] and [RFC 1215](#) [[RFC1215](#)]. The second version, called SMIV2, is described in STD 58, [RFC 2578](#) [[RFC2578](#)], STD 58, [RFC 2579](#) [[RFC2579](#)] and STD 58, [RFC 2580](#) [[RFC2580](#)].
- o Message protocols for transferring management information. The first version of the SNMP message protocol is called SNMPv1 and described in STD 15, [RFC 1157](#) [[RFC1157](#)]. A second version of

the SNMP message protocol, which is not an Internet standards track protocol, is called SNMPv2c and described in [RFC 1901](#)

[RFC1901] and [RFC 1906](#) [RFC1906]. The third version of the message protocol is called SNMPv3 and described in [RFC 1906](#) [RFC1906], [RFC 2572](#) [RFC2572] and [RFC 2574](#) [RFC2574].

- o Protocol operations for accessing management information. The first set of protocol operations and associated PDU formats is described in STD 15, [RFC 1157](#) [RFC1157]. A second set of protocol operations and associated PDU formats is described in [RFC 1905](#) [RFC1905].
- o A set of fundamental applications described in [RFC 2573](#) [RFC2573] and the view-based access control mechanism described in [RFC 2575](#) [RFC2575].

A more detailed introduction to the current SNMP Management Framework can be found in [RFC 2570](#) [RFC2570].

Managed objects are accessed via a virtual information store, termed the Management Information Base or MIB. Objects in the MIB are defined using the mechanisms defined in the SMI.

This memo specifies a MIB module that is compliant to the SMIV2. A MIB conforming to the SMIV1 can be produced through the appropriate translations. The resulting translated MIB must be semantically equivalent, except where objects or events are omitted because no translation is possible (use of Counter64). Some machine readable information in SMIV2 will be converted into textual descriptions in SMIV1 during the translation process. However, this loss of machine readable information is not considered to change the semantics of the MIB.

## **5. Definitions**

```
MPLS-TC-MIB DEFINITIONS ::= BEGIN
```

```
IMPORTS
```

```
    MODULE-IDENTITY, Integer32, Unsigned32, transmission
    FROM SNMPv2-SMI
```

```
    TEXTUAL-CONVENTION
    FROM SNMPv2-TC;
```

```
mplsTCMIB MODULE-IDENTITY
```

```
    LAST-UPDATED "200104101200Z" -- 10 April 2001 12:00:00 GMT
    ORGANIZATION "Multiprotocol Label Switching (MPLS) Working Group"
    CONTACT-INFO
        "
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            Cisco Systems, Inc.
```

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#### DESCRIPTION

"This MIB Module provides Textual Conventions  
and OBJECT-IDENTITY Objects to be used by  
MPLS networks."

-- Revision history.

REVISION "200104101200Z" -- 10 April 2001 12:00:00 GMT

#### DESCRIPTION

"Initial version."

::= { mplsMIB 1 } -- mplsMIB To Be Assigned by IANA

#### mplsMIB OBJECT IDENTIFIER

::= { transmission xxx } -- To be assigned by IANA  
-- Since mpls is ifType: 166  
-- we recommend xxx to be 166

-- The Textual Conventions defined below are organized  
-- alphabetically

#### MplsBitRate ::= TEXTUAL-CONVENTION

DISPLAY-HINT "d"

STATUS current

#### DESCRIPTION

"An estimate of bandwidth in units of 1,000 bits per  
second. If this object reports a value of 'n' then  
the rate of the object is somewhere in the range of  
'n-500' to 'n+499'. For objects which do not vary in  
bit rate, or for those where no accurate estimation  
can be made, this object should contain the nominal  
bit rate."

SYNTAX Integer32 (1..2147483647)

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MplsBurstSize ::= TEXTUAL-CONVENTION

DISPLAY-HINT "d"

STATUS current

DESCRIPTION

"The number of octets of MPLS data that the stream  
may send back-to-back without concern for policing."

SYNTAX Unsigned32 (1..4294967295)

MplsExtendedTunnelId ::= TEXTUAL-CONVENTION

STATUS current

DESCRIPTION

"A unique identifier for an MPLS Tunnel. This MAY  
represent an IPv4 address of the ingress or egress  
LSR for the tunnel. This value is derived from  
the Extended Tunnel Id in RSVP or the Ingress  
Router ID for CR-LDP."

SYNTAX Unsigned32

REFERENCE

- "1. Awduche, D., et al., RSVP-TE: Extensions to RSVP  
for LSP Tunnels,  
[draft-ietf-mpls-rsvp-lsp-tunnel-08.txt](#),  
February 2001.
2. Constraint-Based LSP Setup using LDP, Jamoussi,  
B., et al., [draft-ietf-mpls-cr-ldp-05.txt](#),  
February 2001."

MplsLabel ::= TEXTUAL-CONVENTION

STATUS current

DESCRIPTION

"This value represents an MPLS label.  
The label contents are specific to  
the label being represented.

The label carried in an MPLS shim header  
(for LDP, the Generic Label) is a 20-bit number  
represented by 4 octets. Bits 0-19 contain a  
label or a reserved label value. Bits 20-31 MUST  
be zero.

The frame relay label can be represented by either  
10-bits or 23-bits depending on the DLCI field size and  
the upper 22-bits or upper 9-bits must be zero,  
respectively.

For an ATM label the lower 16-bits represents the VCI,  
the next 12-bits represents the VPI and the remaining

bits MUST be zero."

REFERENCE

1. MPLS Label Stack Encoding, Rosen et al, [RFC 3032](#), January 2001.
2. Use of Label Switching on Frame Relay Networks, Conta et al, [RFC 3034](#), January 2001.
3. MPLS using LDP and ATM VC switching, Davie et al, [RFC 3035](#), January 2001."

SYNTAX Unsigned32 (0..4294967295)

-- A similar TC is also used in [RFC2677](#).txt. NOTE: since  
-- MPLS's goal is to be any layer2 over any layer3, this  
-- MIB makes every attempt to define a TC which would  
-- satisfy L2 and L3 address sizes for now and in  
-- the future.

MplsLdpGenAddr ::= TEXTUAL-CONVENTION

STATUS current

DESCRIPTION

"The value of an network layer or data link  
layer address."

SYNTAX OCTET STRING (SIZE (0..64))

MplsLdpIdentifier ::= TEXTUAL-CONVENTION

STATUS current

DESCRIPTION

"The LDP identifier is a six octet quantity  
which is used to identify an Label Switch Router  
(LSR) label space.

The first four octets encode an IP address  
assigned to the LSR, and the last two octets  
identify a specific label space within the LSR."

SYNTAX OCTET STRING (SIZE (6))

MplsLdpLabelTypes ::= TEXTUAL-CONVENTION

STATUS current

DESCRIPTION

"The Layer 2 label types which are defined for  
MPLS LDP/CRLDP are generic(1), atm(2), or  
frameRelay(3)."

SYNTAX INTEGER {  
generic(1),  
atm(2),  
frameRelay(3)}

}

```
-- This was taken from rfc2514.txt (AtmVcIdentifier) and
-- modified here for MPLS.
-- This TC agrees with "MPLS using LDP and ATM VC Switching"
-- document which specifies that VC values need
-- to be greater than 31, or in other words, 0-31 are
-- reserved for other uses by the ITU and ATM Forum.
```

```
MplsAtmVcIdentifier ::= TEXTUAL-CONVENTION
    STATUS      current
    DESCRIPTION
        "The VCI value for a VCL. The maximum VCI value
        cannot exceed the value allowable by
        atmInterfaceMaxVciBits defined in ATM-MIB.
        The minimum value is 32, values 0 to 31 are
        reserved for other uses by the ITU and ATM
        Forum. 32 is typically the default value
        for the Control VC."
    SYNTAX      Integer32 (32..65535)
```

```
MplsLSPID ::= TEXTUAL-CONVENTION
    STATUS      current
    DESCRIPTION
        "An identifier that is assigned to each LSP and is
        used to uniquely identify it. This is assigned at
        the head end of the LSP and can be used by all LSRs
        to identify this LSP. This value is piggybacked by
        the signaling protocol when this LSP is signaled
        within the network. This identifier can then be
        used at each LSR to identify which labels are being
        swapped to other labels for this LSP. For IPv4
        addresses this results in a 6-octet long cookie."
    SYNTAX      OCTET STRING (SIZE (0..31))
```

```
MplsLsrIdentifier ::= TEXTUAL-CONVENTION
    STATUS      current
    DESCRIPTION
        "The Label Switch Router (LSR) identifier is the
        first 4 bytes of the Router Id component
        of the Label Distribution Protocol (LDP)
        identifier."
    SYNTAX      OCTET STRING (SIZE (4))
```

```
MplsInitialCreationSource ::= TEXTUAL-CONVENTION
    STATUS      current
    DESCRIPTION
```

"The entity that originally created the object in question. The values of this enumeration are

defined as follows:

- other(1)        - This is used when an entity which has not been enumerated in this textual convention but which is known by the agent.
- snmp(2)        - The Simple Network Management Protocol was used to configure this object initially.
- ldp(3)        - The Label Distribution Protocol was used to configure this object initially.
- rsvp(4)        - The Resource Reservation Protocol was used to configure this object initially.
- crldp(5)       - The Constraint-Based Label Distribution Protocol was used to configure this object initially.
- policyAgent(6) - A policy agent (perhaps in combination with one of the above protocols) was used to configure this object initially.
- unknown(7) -- the agent cannot discern which component created the object."

```
SYNTAX  INTEGER {  
    other(1),  
    snmp(2),  
    ldp(3),  
    rsvp(4),  
    crldp(5),  
    policyAgent(6),  
    unknown (7)  
}
```

MplsPathIndex ::= TEXTUAL-CONVENTION

STATUS        current

DESCRIPTION

"A unique identifier used to identify a specific path  
used by a tunnel."

SYNTAX Unsigned32

MplsPathIndexOrZero ::= TEXTUAL-CONVENTION

STATUS        current

DESCRIPTION

"A unique identifier used to identify a specific path used by a tunnel. If this value is set to 0, it



indicates that no path is in use."  
SYNTAX Unsigned32

MplsTunnelAffinity ::= TEXTUAL-CONVENTION  
STATUS current  
DESCRIPTION  
"Include-any, include-all, or exclude-all constraint  
for link selection."  
SYNTAX Unsigned32

MplsTunnelIndex ::= TEXTUAL-CONVENTION  
STATUS current  
DESCRIPTION  
"Index into mplsTunnelTable."  
SYNTAX Integer32 (1..65535)

MplsTunnelInstanceIndex ::= TEXTUAL-CONVENTION  
STATUS current  
DESCRIPTION  
"Instance index into mplsTunnelTable."  
SYNTAX Unsigned32 (0..65535)

-- End of MPLS-TC-MIB  
END

## **6. Security Considerations**

This memo defines textual conventions and object identities for use in MPLS MIB modules. Security issues for these MIB modules are addressed in the memos defining those modules.

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## **8. Authors' Addresses**

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