Definitions of Managed Objects for the Multiprotocol Label Switching, Label Distribution Protocol (LDP)

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<draft-ietf-mpls-ldp-mib-01.txt>

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Abstract

This memo defines a portion of the Management Information Base (MIB) for use with network management protocols in the Internet community. In particular, it describes managed objects for the Multiprotocol Label Switching, Label Distribution Protocol (LDP).
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1. 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 describes managed objects for the Multiprotocol Label Switching, Label Distribution Protocol (LDP) [18].

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 [22].

2. The SNMP Management Framework

The SNMP Management Framework presently consists of five major components:

- An overall architecture, described in RFC 2571 [RFC2571].
- 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], RFC 2579 [RFC2579] and RFC 2580 [RFC2580].
- 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. The third version of the message protocol is called SNMPv3 and described in RFC 1906 [RFC1906], RFC 2572 [RFC2572] and RFC 2574 [RFC2574].
- 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].
- 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.
3. Structure of the MIB

The following aspects are not addressed in this document: Interfaces with respect to the IFMIB (e.g. is ldp an interface in the sense of being stacked onto of the data link layer, and its relationship to the network layer), VPN issues (i.e. potential MIB objects such as the VPN Identifier are not included at this time), and lastly, multicast issues are not discussed.

Some of these issues need further clarification before adding to this MIB.

Currently, there is two groups. The MPLS LDP General Group and the MPLS LDP Notifications Group.

3.1. The MPLS LDP General Group

This group contains information about the specific LDP Entities which are associated with this agent. Each LSR must have one LDP Entity.

3.1.1. The Label Distribution Protocol’s Entity Table

The LDP Entity Table represents the LDP Entities which exist on a single Label Switch Router (LSR). The LDP Entity performs the LDP protocol. There must be at least one LDP Entity for the LSR to support LDP.

Each entry/row in this table represents a single LDP Entity.

3.1.2. The Label Distribution Protocol’s Entity Statistics Table

The LDP Entity Statistics Table will maintain counters related to an LDP Entity. This Table should be a read-only table which contains statistical information.

Each row in this table will be related to a single LDP Entity.

3.1.3. The LDP Peer Table

The LDP Peer Table contains information about LDP Peers. Each row in this table represents an LDP Peer which is known to an LDP Entity.
3.1.4. The LDP Sessions Table

Each entry in this table represents a session between an LDP Entity and a Peer.

3.1.5. The LDP Adjacencies Table

This is a table of all adjacencies between all LPD Entities and all LDP Peers. A Session may have one or more adjacencies.

3.1.6. The LDP Label Information Base (LIB) Table

TBD. Some potential objects: incoming label, outgoing label, and the mid.

3.2. The LDP Notifications Group

3.2.1. LDP Notifications

Currently, there is one notification which will be sent when an LDP attempts to initialize the same session beyond the configured threshold.

4. MPLS Label Distribution Protocol MIB Definitions

MPLS-LDP-MIB DEFINITIONS ::= BEGIN

IMPORTS
  OBJECT-TYPE, MODULE-IDENTITY, NOTIFICATION-TYPE,
  experimental,
  Integer32, Counter32, Unsigned32
  FROM SNMPv2-SMI
  MODULE-COMPLIANCE, OBJECT-GROUP, NOTIFICATION-GROUP
  FROM SNMPv2-CONF

  TEXTUAL-CONVENTION, TruthValue, RowStatus, TimeInterval
  FROM SNMPv2-TC
  ifIndex
  FROM IF-MIB
  AddressFamilyNumbers
    FROM IANA-ADDRESS-FAMILY-NUMBERS-MIB


mplsLdpMIB MODULE-IDENTITY
LAST-UPDATED "9906301200Z" -- June 30, 1999
ORGANIZATION "Multiprotocol Label Switching (mpls) Working Group"
CONTACT-INFO
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Ericsson
James V. Luciani (luciani@baynetworks.com)
Nortel Networks"
DESCRIPTION
"This MIB contains managed object definitions for the
Multiprotocol Label Switching, Label Distribution
Protocol, LDP, as defined in draft-ietf-mpls-ldp-04.txt."
 ::= ( experimental 9876 ) -- to be assigned

--********************************************************************
-- MPLS LDP Textual Conventions
--********************************************************************

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

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))
AtmVpIdentifier ::= TEXTUAL-CONVENTION  
STATUS current  
DESCRIPTION  
"The VPI value for a VPL. The value VPI=0 is not used for a VPL not associated with a VCL. For ATM UNIs supporting VPCs the VPI value ranges from 1 to 255. For ATM UNIs supporting VCCs the VPI value ranges from 0 to 255. The maximum VPI value cannot exceed the value allowable by atmInterfaceMaxVpiBits defined in ATM-MIB."
SYNTAX Unsigned32 (0..4095)

AtmVcIdentifier ::= 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."
SYNTAX Unsigned32 (0..65535)

-- Top-level structure of the MIB (the following is proposed)
mls  OBJECT IDENTIFIER ::= { mplsProtocols }

mlsProtocols  OBJECT IDENTIFIER ::= { mplsLdpObjects }
-- under mlsProtocols will be LDP, CR-LDP, -- and other MPLS "Protocols".

mlsLdpObjects  OBJECT IDENTIFIER ::= { mplsLdpMIB 1 }
mlsLdpNotifications  OBJECT IDENTIFIER ::= { mplsLdpMIB 2 }
mlsLdpConformance  OBJECT IDENTIFIER ::= { mplsLdpMIB 3 }

--************************************************************************
-- MPLS LDP Objects
--************************************************************************

mlsLdpLsrObjects  OBJECT IDENTIFIER ::= { mplsLdpObjects 1 }

mlsLdpEntityObjects  OBJECT IDENTIFIER ::= { mplsLdpObjects 2 }

--
-- The MPLS Label Distribution Protocol Label Switch Router Objects
--

mlsLdpLsrID OBJECT-TYPE  
SYNTAX MplsLsrIdentifier  
MAX-ACCESS read-only  
STATUS current  
DESCRIPTION  
"The LSR’s Identifier."
::= { mplsLdpLsrObjects 1 }

mplsLdpLsrLoopDetectionPresent OBJECT-TYPE
SYNTAX     TruthValue
MAX-ACCESS read-only
STATUS     current
DESCRIPTION
  "A indication of whether this LSR supports
  loop detection.  A value of 'true' indicates
  this LSR does support loop detection.  A value
  of 'false' indicates this LSR does not support
  loop detection."
::= { mplsLdpLsrObjects 2 }

mplsLdpLsrLoopDetectionAdminStatus OBJECT-TYPE
SYNTAX     INTEGER {
            enabled(1),
            disabled(2)
         }
MAX-ACCESS read-write
STATUS     current
DESCRIPTION
  "To enable loop detection the value of
  this object should be 'enabled(1)'.
  Otherwise, to turn off loop detection,
  set this value to 'disabled(2)'.'"
::= { mplsLdpLsrObjects 3 }

mplsLdpLsrPathVectorLimit OBJECT-TYPE
SYNTAX     Integer32
MAX-ACCESS read-write
STATUS     current
DESCRIPTION
  "This object only has meaning if
  mplsLdpLsrLoopDetectionPresent has
  the value of 'true'.

  The value of this object represents the
  limit of path vectors which this LSR uses
  to treat the message as if it had
  traversed a loop."
::= { mplsLdpLsrObjects 4 }

mplsLdpLsrHopCountLimit OBJECT-TYPE
SYNTAX     Integer32
MAX-ACCESS read-write
STATUS     current
DESCRIPTION
  "This object only has meaning if
  mplsLdpLsrLoopDetectionPresent has
the value of 'true'.

The value of this object represents the limit on the Hop Count which this LSR uses to treat the message as if it had traversed a loop."

::= { mplsLdpLsrObjects 5 }

mplsLdpLsrLoopPreventionPresent OBJECT-TYPE
SYNTAX TruthValue
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"A indication of whether this LSR supports loop prevention. A value of 'true' indicates this LSR does support loop prevention. A value of 'false' indicates this LSR does not support loop prevention."

::= { mplsLdpLsrObjects 6 }

mplsLdpLsrLoopPreventionAdminStatus OBJECT-TYPE
SYNTAX INTEGER { enabled(1), disabled(2) }
MAX-ACCESS read-write
STATUS current
DESCRIPTION
"To enable loop prevention the value of this object should be 'enabled(1)'. Otherwise, to turn off loop prevention, set this value to 'disabled(2)'."

::= { mplsLdpLsrObjects 7 }

mplsLdpLsrLabelRetentionMode OBJECT-TYPE
SYNTAX INTEGER { conservative(1), liberal(2) }
MAX-ACCESS read-write
STATUS current
DESCRIPTION
"The LSR can be configured to use either conservative or liberal label retention mode.

If the value of this object is conservative(1) then advertized label mappings are retained only if they will be used to forward packets, i.e. if label came from a valid next hop."
If the value of this object is liberal(2) then all advertized label mappings are retained whether they are from a valid next hop or not.

::= { mplsLdpLsrObjects 8 }

-- The MPLS Label Distribution Protocol Entity Table

mplsLdpEntityTable OBJECT-TYPE
SYNTAX SEQUENCE OF MplsLdpEntityEntry
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION "This table contains information about the MPLS Label Distribution Protocol Entities which exist on this Label Switch Router (LSR)."
::= { mplsLdpEntityObjects 1 }

mplsLdpEntityEntry OBJECT-TYPE
SYNTAX MplsLdpEntityEntry
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION "An entry in this table represents an LDP entity. An entry can be created by a network administrator or by an SNMP agent as instructed by LDP.

An LDP Entity is uniquely indexed by its LDP Identifier."
INDEX { mplsLdpEntityID }
::= { mplsLdpEntityTable 1 }

MplsLdpEntityEntry ::= SEQUENCE {
  mplsLdpEntityID MplsLdpIdentifier,
  mplsLdpEntityLabelSpaceType INTEGER,
  mplsLdpEntityDefVpi AtmVpIdentifier,
  mplsLdpEntityDefVci AtmVcIdentifier,
  mplsLdpEntityUnlabTrafVpi AtmVpIdentifier,
  mplsLdpEntityUnlabTrafVci AtmVcIdentifier,
  mplsLdpEntityMergeCapability INTEGER,
  mplsLdpEntityVcDirectionality INTEGER,
  mplsLdpEntityWellKnownDiscoveryPort Unsigned32,
  mplsLdpEntityMtu Integer32,
  mplsLdpEntityKeepAliveHoldTimer Integer32,
  mplsLdpEntityFailedInitSessionThreshold Integer32,
  mplsLdpEntityLabelDistributionMethod INTEGER,
  mplsLdpEntityRowStatus RowStatus
}

Expires December 1999
mplsLdpEntityID OBJECT-TYPE
SYNTAX      MplsLdpIdentifier
MAX-ACCESS  not-accessible
STATUS      current
DESCRIPTION
"The LDP identifier which uniquely identifies the LDP Entity. This 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."
REFERENCE
"LDP Specification, Section on LDP Identifiers."
::= { mplsLdpEntityEntry 1 }

mplsLdpEntityLabelSpaceType OBJECT-TYPE
SYNTAX      INTEGER {
    unknown(1),
    perInterface(2),
    perPlatform(3)
}
MAX-ACCESS read-create
STATUS      current
DESCRIPTION
"The type of label spaces associated with this LDP Entity. The values are

'unknown(1)' The type of label space is not known.
'perInterface(2)' The type of label space is tied to an interface.
'perPlatform(3)' The type of label space is tied to the platform."
REFERENCE
"LDP Specification, Section on Label Spaces."
::= { mplsLdpEntityEntry 2 }

mplsLdpEntityDefVpi OBJECT-TYPE
SYNTAX      AtmVpIdentifier
MAX-ACCESS read-create
STATUS      current
DESCRIPTION
"The Default VPI value used in the label for the default VPI."
::= { mplsLdpEntityEntry 3 }
mplsLdpEntityDefVci OBJECT-TYPE
SYNTAX    AtmVcIdentifier
MAX-ACCESS read-create
STATUS    current
DESCRIPTION
"The Default VCI value used in the label for the default VCI."
::= { mplsLdpEntityEntry 4 }

mplsLdpEntityUnlabTrafVpi OBJECT-TYPE
SYNTAX    AtmVpIdentifier
MAX-ACCESS read-create
STATUS    current
DESCRIPTION
"VPI value of the VCC supporting unlabeled traffic."
DEFVAL  { 0 }
::= { mplsLdpEntityEntry 5 }

mplsLdpEntityUnlabTrafVci OBJECT-TYPE
SYNTAX    AtmVcIdentifier
MAX-ACCESS read-create
STATUS    current
DESCRIPTION
"VCI value of the VCC supporting unlabeled traffic."
DEFVAL  { 31 }
::= { mplsLdpEntityEntry 6 }

mplsLdpEntityMergeCapability OBJECT-TYPE
SYNTAX    INTEGER {  
    noMerge(0),
    vpMerge(1),
    vcMerge(2),
    vpVcMerge(3)
  }
MAX-ACCESS read-create
STATUS    current
DESCRIPTION
"Sets the merge capability for this LDP entity."
REFERENCE
"draft-ietf-mpls-ldp-04.txt, Section 3.5.3"
::= { mplsLdpEntityEntry 7 }

mplsLdpEntityVcDirectionality OBJECT-TYPE
SYNTAX    INTEGER {  
    bidirectional(1),
    unidirectional(2)
  }
MAX-ACCESS read-create
STATUS    current
DESCRIPTION
"Sets the VC directionality for this LDP entity."

REFERENCE

"draft-ietf-mpls-ldp-04.txt, Section 3.5.3"

::= { mplsLdpEntityEntry 8 }

mplsLdpEntityWellKnownDiscoveryPort OBJECT-TYPE
SYNTAX     Unsigned32
MAX-ACCESS read-create
STATUS      current
DESCRIPTION
"The well known LDP Discovery Port."
::= { mplsLdpEntityEntry 9 }

mplsLdpEntityMtu OBJECT-TYPE
SYNTAX     Integer32 (0..65535)
MAX-ACCESS read-create
STATUS      current
DESCRIPTION
"The maximum transmission unit (MTU) that was configured
for this entity."
::= { mplsLdpEntityEntry 10 }

mplsLdpEntityKeepAliveHoldTimer OBJECT-TYPE
SYNTAX     Integer32 (1..65535)
UNITS       "seconds"
MAX-ACCESS read-create
STATUS      current
DESCRIPTION
"The two octet value which is the proposed keep alive hold
timer for this LDP Entity."
::= { mplsLdpEntityEntry 11 }

mplsLdpEntityFailedInitSessionThreshold OBJECT-TYPE
SYNTAX     Integer32
MAX-ACCESS read-create
STATUS      current
DESCRIPTION
"When attempting to establish a session with a
given Peer, the given LDP Entity should
send out a notification when exceeding this threshold.
A value of 0 (zero) for this object
indicates that the threshold is infinity.
In other words, a notification will not
be sent if the value of this object is 0 (zero)."
::= { mplsLdpEntityEntry 12 }

mplsLdpEntityLabelDistributionMethod OBJECT-TYPE
SYNTAX     INTEGER {
downstreamOnDemand(1),
downstreamUnsolicited(2)
}
MAX-ACCESS read-create
STATUS current
DESCRIPTION
"For any given LDP session, the method of
label distribution must be specified."
REFERENCE
"draft-ietf-mpls-arch-04.txt [20]."
 ::= { mplsLdpEntityEntry 13 }

mplsLdpEntityRowStatus OBJECT-TYPE
SYNTAX RowStatus
MAX-ACCESS read-create
STATUS current
DESCRIPTION
"An object that allows entries in this table to
be created and deleted using the
RowStatus convention."
 ::= { mplsLdpEntityEntry 14 }

--
-- The MPLS LDP Entity Configurable ATM Label Range Table
--

mplsLdpEntityConfAtmLabelRangeTable OBJECT-TYPE
SYNTAX SEQUENCE OF MplsLdpEntityConfAtmLabelRangeEntry
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
"The MPLS LDP Entity Configurable ATM Label Range Table.
The purpose of this table is to provide a mechanism for specifying a contiguous range of vpi’s with a contiguous range of vci’s, or a ‘label range’ for LDP Entities.

LDP Entities which use ATM must have at least one entry in this table."
 ::= { mplsLdpEntityObjects 2 }

mplsLdpEntityConfAtmLabelRangeEntry OBJECT-TYPE
SYNTAX MplsLdpEntityConfAtmLabelRangeEntry
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
"A row in the LDP Entity Configurable ATM Label Range Table. One entry in this table contains information on a single range of labels represented by the configured Upper and Lower Bounds VPI/VCI pairs.
NOTE: The ranges for a specific LDP Entity are UNIQUE and non-overlapping. For example, for a specific LDP Entity index, there could be one entry having ConfLowerBound vpi/vci == 0/32, and ConfUpperBound vpi/vci == 0/100, and a second entry for this same interface with ConfLowerBound vpi/vci == 0/101 and ConfUpperBound vpi/vci == 0/200. However, there could not be a third entry with ConfLowerBound vpi/vci == 0/200 and ConfUpperBound vpi/vci == 0/300 because this label range overlaps with the second entry (i.e. both entries now have 0/200).

A row will not be created unless a unique and non-overlapping range is specified. Thus, row creation implies a one-shot row creation of LDP EntityID and ConfLowerBound vpi/vci and ConfUpperBound vpi/vci. At least one label range entry for a specific LDP Entity MUST include the default VPI/VCI values denoted in the LDP Entity Table.

INDEX { mplsLdpEntityID, mplsLdpEntityConfAtmLabelRangeLowerBoundVPI, mplsLdpEntityConfAtmLabelRangeLowerBoundVCI }
::= { mplsLdpEntityConfAtmLabelRangeTable 1 }

MplsLdpEntityConfAtmLabelRangeEntry ::= SEQUENCE {
   mplsLdpEntityConfAtmLabelRangeLowerBoundVPI  AtmVpIdentifier,
   mplsLdpEntityConfAtmLabelRangeLowerBoundVCI  AtmVcIdentifier,
   mplsLdpEntityConfAtmLabelRangeUpperBoundVPI  AtmVpIdentifier,
   mplsLdpEntityConfAtmLabelRangeUpperBoundVCI  AtmVcIdentifier,
   mplsLdpEntityConfAtmLabelRangeRowStatus      RowStatus
}

mplsLdpEntityConfAtmLabelRangeLowerBoundVPI OBJECT-TYPE
SYNTAX AtmVpIdentifier
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
   "The minimum VPI number configured for this range."
::= { mplsLdpEntityConfAtmLabelRangeEntry 1 }

mplsLdpEntityConfAtmLabelRangeLowerBoundVCI OBJECT-TYPE
SYNTAX AtmVcIdentifier
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
   "The minimum VCI number configured for this range."
::= { mplsLdpEntityConfAtmLabelRangeEntry 2 }

mplsLdpEntityConfAtmLabelRangeUpperBoundVPI OBJECT-TYPE
SYNTAX AtmVpIdentifier
MAX-ACCESS read-create
STATUS current
DESCRIPTION
"The maximum VPI number configured for this range."
::= { mplsLdpEntityConfAtmLabelRangeEntry 3 }

mplsLdpEntityConfAtmLabelRangeUpperBoundVCI OBJECT-TYPE
SYNTAX   AtmVcIdentifier
MAX-ACCESS read-create
STATUS   current
DESCRIPTION
"The maximum VCI number configured for this range."
::= { mplsLdpEntityConfAtmLabelRangeEntry 4 }

mplsLdpEntityConfAtmLabelRangeRowStatus OBJECT-TYPE
SYNTAX   RowStatus
MAX-ACCESS read-create
STATUS   current
DESCRIPTION
"An object that allows entries in this
   table to be created and deleted using
   the RowStatus convention."
::= { mplsLdpEntityConfAtmLabelRangeEntry 5 }

--
-- The MPLS LDP Entity Statistics Table
--

mplsLdpEntityStatsTable OBJECT-TYPE
SYNTAX   SEQUENCE OF MplsLdpEntityStatsEntry
MAX-ACCESS not-accessible
STATUS   current
DESCRIPTION
"This table is a read-only table which augments
   the MplsLdpConfEntityTable. The purpose of this
   table is to keep statistical information about
   the LDP Entities on the LSR."
::= { mplsLdpEntityObjects 3 }

mplsLdpEntityStatsEntry OBJECT-TYPE
SYNTAX   MplsLdpEntityStatsEntry
MAX-ACCESS not-accessible
STATUS   current
DESCRIPTION
"A row in this table contains statistical information
   about an LDP Entity."
AUGMENTS   { mplsLdpEntityEntry }
::= { mplsLdpEntityStatsTable 1 }

MplsLdpEntityStatsEntry ::= SEQUENCE {
  mplsLdpAttemptedSessions   Counter32
mplsLdpAttemptedSessions OBJECT-TYPE
SYNTAX Counter32
MAX-ACCESS read-only
STATUS current
DESCRIPTION "A count of the total attempted sessions for this LDP Entity."
 ::= { mplsLdpEntityStatsEntry 1 }

-- The MPLS LDP Peer Table
--

mplsLdpPeerObjects OBJECT IDENTIFIER ::= { mplsLdpObjects 3 }

mplsLdpPeerTable OBJECT-TYPE
SYNTAX SEQUENCE OF MplsLdpPeerEntry
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION "Information about LDP peers which have been discovered by the LDP Entities that are managed by this agent."
 ::= { mplsLdpPeerObjects 1 }

mplsLdpPeerEntry OBJECT-TYPE
SYNTAX MplsLdpPeerEntry
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION "Information about a single Peer."
INDEX { mplsLdpEntityID, mplsLdpPeerIndex }
 ::= { mplsLdpPeerTable 1 }

MplsLdpPeerEntry ::= SEQUENCE {
 mplsLdpPeerIndex Unsigned32,
 mplsLdpPeerID MplsLdpIdentifier,
 mplsLdpPeerInternetworkAddrType AddressFamilyNumbers,
 mplsLdpPeerInternetworkAddr MplsLdpGenAddr,
 mplsLdpPeerDefaultMtu Integer32,
 mplsLdpPeerKeepAliveHoldTimer Integer32,
 mplsLdpPeerLabelDistributionMethod INTEGER,
 mplsLdpPeerRowStatus RowStatus
}

mplsLdpPeerIndex OBJECT-TYPE
SYNTAX Unsigned32 (1..4294967295)

Expires December 1999
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
"An identifier for the LDP peer that is unique within the
scope of this agent."
::= { mplsLdpPeerEntry 1 }

mplsLdpPeerID OBJECT-TYPE
SYNTAX MplsLdpIdentifier
MAX-ACCESS read-create
STATUS current
DESCRIPTION
"The LDP identifier of this LDP Peer."
::= { mplsLdpPeerEntry 2 }

mplsLdpPeerInternetworkAddrType OBJECT-TYPE
SYNTAX AddressFamilyNumbers
MAX-ACCESS read-create
STATUS current
DESCRIPTION
"The type of the internetwork layer address of this
LDP peer. This object indicates how the value of
mplsLdpPeerInternetworkAddr is to be interpreted."
::= { mplsLdpPeerEntry 3 }

mplsLdpPeerInternetworkAddr OBJECT-TYPE
SYNTAX MplsLdpGenAddr
MAX-ACCESS read-create
STATUS current
DESCRIPTION
"The value of the internetwork layer address of this LDP peer."
::= { mplsLdpPeerEntry 4 }

mplsLdpPeerDefaultMtu OBJECT-TYPE
SYNTAX Integer32 (0..65535)
MAX-ACCESS read-create
STATUS current
DESCRIPTION
"The default maximum transmission unit (MTU) of the
LDP Peer."
DEFVAL { 9180 }
::= { mplsLdpPeerEntry 5 }

mplsLdpPeerKeepAliveHoldTimer OBJECT-TYPE
SYNTAX Integer32 (1..65535)
UNITS "seconds"
MAX-ACCESS read-create
STATUS current
DESCRIPTION
"The two octet unsigned non zero integer that indicates
the number of seconds that this Peer proposes for the value of the KeepAlive Interval.

::= {mplsLdpPeerEntry 6}

mplsLdpPeerLabelDistributionMethod OBJECT-TYPE
SYNTAX INTEGER {
  downstreamOnDemand(1),
  downstreamUnsolicited(2)
}
MAX-ACCESS read-create
STATUS current
DESCRIPTION "For any given LDP session, the method of label distribution must be specified."
REFERENCE "draft-ietf-mpls-arch-05.txt [20]."
::= {mplsLdpPeerEntry 7}

mplsLdpPeerRowStatus OBJECT-TYPE
SYNTAX RowStatus
MAX-ACCESS read-create
STATUS current
DESCRIPTION "An object that allows entries in this table to be created and deleted using the RowStatus convention."
::= {mplsLdpPeerEntry 8}

--
-- The MPLS LDP Peer Configurable ATM Label Range Table
--

mplsLdpPeerConfAtmLabelRangeTable OBJECT-TYPE
SYNTAX SEQUENCE OF MplsLdpPeerConfAtmLabelRangeEntry
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION "The MPLS LDP Peer Configurable ATM Label Range Table. The purpose of this table is to provide a mechanism for specifying a contiguous range of vpi’s with a contiguous range of vci’s, or a ‘label range’ for LDP Peers. LDP Peers which use ATM must have at least one entry in this table."
::= {mplsLdpPeerObjects 2}

mplsLdpPeerConfAtmLabelRangeEntry OBJECT-TYPE
SYNTAX MplsLdpPeerConfAtmLabelRangeEntry
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION "A row in the LDP Peer Configurable ATM Label Range Table."
One entry in this table contains information on a single range of labels represented by the configured Upper and Lower Bounds VPI/VCI pairs.

NOTE: The ranges for a specific LDP Peer are UNIQUE and non-overlapping. For example, for a specific LDP Peer index, there could be one entry having ConfLowerBound vpi/vci == 0/32, and ConfUpperBound vpi/vci == 0/100, and a second entry for this same interface with ConfLowerBound vpi/vci == 0/101 and ConfUpperBound vpi/vci == 0/200. However, there could not be a third entry with ConfLowerBound vpi/vci == 0/200 and ConfUpperBound vpi/vci == 0/300 because this label range overlaps with the second entry (i.e. both entries now have 0/200).

A row will not be created unless a unique and non-overlapping range is specified. Thus, row creation implies a one-shot row creation of LDP PeerIndex and ConfLowerBound vpi/vci and ConfUpperBound vpi/vci. At least one label range entry for a specific LDP Peer MUST include the default VPI/VCI values denoted in the LDP Peer Table.

INDEX { mplsLdpPeerIndex, mplsLdpPeerConfAtmLabelRangeLowerBoundVPI, mplsLdpPeerConfAtmLabelRangeLowerBoundVCI } ::= { mplsLdpPeerConfAtmLabelRangeTable 1 }

MplsLdpPeerConfAtmLabelRangeEntry ::= SEQUENCE {
    mplsLdpPeerConfAtmLabelRangeLowerBoundVPI      AtmVpIdentifier,
    mplsLdpPeerConfAtmLabelRangeLowerBoundVCI      AtmVcIdentifier,
    mplsLdpPeerConfAtmLabelRangeUpperBoundVPI      AtmVpIdentifier,
    mplsLdpPeerConfAtmLabelRangeUpperBoundVCI      AtmVcIdentifier,
    mplsLdpPeerConfAtmLabelRangeRowStatus          RowStatus
}

mplsLdpPeerConfAtmLabelRangeLowerBoundVPI OBJECT-TYPE
SYNTAX AtmVpIdentifier
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
"The minimum VPI number configured for this range."
 ::= { mplsLdpPeerConfAtmLabelRangeEntry 1 }

mplsLdpPeerConfAtmLabelRangeLowerBoundVCI OBJECT-TYPE
SYNTAX AtmVcIdentifier
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
"The minimum VCI number configured for this range."
 ::= { mplsLdpPeerConfAtmLabelRangeEntry 2 }
mplsLdpPeerConfAtmLabelRangeUpperBoundVPI OBJECT-TYPE
SYNTAX     AtmVpIdentifier
MAX-ACCESS read-create
STATUS     current
DESCRIPTION
"The maximum VPI number configured for this range."
::= { mplsLdpPeerConfAtmLabelRangeEntry 3 }

mplsLdpPeerConfAtmLabelRangeUpperBoundVCI OBJECT-TYPE
SYNTAX     AtmVcIdentifier
MAX-ACCESS read-create
STATUS     current
DESCRIPTION
"The maximum VCI number configured for this range."
::= { mplsLdpPeerConfAtmLabelRangeEntry 4 }

mplsLdpPeerConfAtmLabelRangeRowStatus OBJECT-TYPE
SYNTAX     RowStatus
MAX-ACCESS read-create
STATUS     current
DESCRIPTION
"An object that allows entries in this table to be created and deleted using the RowStatus convention."
::= { mplsLdpPeerConfAtmLabelRangeEntry 5 }

--
-- The MPLS LDP Sessions Table
--

mplsLdpSessionObjects OBJECT IDENTIFIER ::= { mplsLdpObjects 4 }

mplsLdpSessionTable OBJECT-TYPE
SYNTAX     SEQUENCE OF MplsLdpSessionEntry
MAX-ACCESS not-accessible
STATUS     current
DESCRIPTION
"A table of Sessions between the LDP Entities and LDP Peers."
::= { mplsLdpSessionObjects 1 }

mplsLdpSessionEntry OBJECT-TYPE
SYNTAX     MplsLdpSessionEntry
MAX-ACCESS not-accessible
STATUS     current
DESCRIPTION
"An entry in this table represents information on a single session between an LDP Entity and LDP Peer."
INDEX     { mplsLdpEntityID, mplsLdpPeerIndex, mplsLdpSessionIndex }
MplsLdpSessionEntry ::= SEQUENCE {
    mplsLdpSessionIndex                          Unsigned32,
    mplsLdpSessionID                             MplsLdpIdentifier,
    mplsLdpSessionProtocolVersion                Integer32,
    mplsLdpSessionKeepAliveHoldTimeRemaining     TimeInterval,
    mplsLdpSessionRole                           INTEGER,
    mplsLdpSessionState                          INTEGER,
    mplsLdpSessionAtmLabelRangeLowerBoundVPI     AtmVpIdentifier,
    mplsLdpSessionAtmLabelRangeLowerBoundVCI     AtmVcIdentifier,
    mplsLdpSessionAtmLabelRangeUpperBoundVPI     AtmVpIdentifier,
    mplsLdpSessionAtmLabelRangeUpperBoundVCI     AtmVcIdentifier,
    mplsLdpSessionRowStatus                      RowStatus
}

mplsLdpSessionIndex OBJECT-TYPE
SYNTAX      Unsigned32 (1..4294967295)
MAX-ACCESS  not-accessible
STATUS      current
DESCRIPTION
    "An unique identifier for this entry such that it
identifies a specific LDP Session."
::= { mplsLdpSessionEntry 1 }

mplsLdpSessionID OBJECT-TYPE
SYNTAX      MplsLdpIdentifier
MAX-ACCESS  read-only
STATUS      current
DESCRIPTION
    "The LDP Session identifier."
::= { mplsLdpSessionEntry 2 }

mplsLdpSessionProtocolVersion OBJECT-TYPE
SYNTAX      Integer32(0..65535)
MAX-ACCESS  read-only
STATUS      current
DESCRIPTION
    "The version of the LDP Protocol which
this session is using."
::= { mplsLdpSessionEntry 3 }

mplsLdpSessionKeepAliveHoldTimeRemaining OBJECT-TYPE
SYNTAX      TimeInterval
MAX-ACCESS  read-only
STATUS      current
DESCRIPTION
    "The keep alive hold time remaining for this session."
::= { mplsLdpSessionEntry 4 }

Expires December 1999
mplsLdpSessionRole OBJECT-TYPE
SYNTAX INTEGER {
    active(1),
    passive(2)
} 
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"An indication of whether the LDP Entity associated with
this session is acting in an 'active' role or
a 'passive' role."
::= { mplsLdpSessionEntry 5 }

mplsLdpSessionState OBJECT-TYPE
SYNTAX INTEGER {
    nonexistent(1),
    initialized(2),
    openrec(3),
    opensent(4),
    operational(5)
} 
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"The current state of the session, all of the
states 1 - 5 are based on the state machine for
session negotiation behavior."
::= { mplsLdpSessionEntry 6 }

mplsLdpSessionAtmLabelRangeLowerBoundVPI OBJECT-TYPE
SYNTAX AtmVpIdentifier
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"The minimum VPI number for this range."
::= { mplsLdpSessionEntry 7 }

mplsLdpSessionAtmLabelRangeLowerBoundVCI OBJECT-TYPE
SYNTAX AtmVcIdentifier
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"The minimum VCI number for this range."
::= { mplsLdpSessionEntry 8 }

mplsLdpSessionAtmLabelRangeUpperBoundVPI OBJECT-TYPE
SYNTAX AtmVpIdentifier
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"The maximum VPI number for this range."
::= { mplsLdpSessionEntry 9 }

mplsLdpSessionAtmLabelRangeUpperBoundVCI OBJECT-TYPE
SYNTAX  AtmVcIdentifier
MAX-ACCESS read-only
STATUS  current
DESCRIPTION
"The maximum VCI number for this range."
::= { mplsLdpSessionEntry 10 }

mplsLdpSessionRowStatus OBJECT-TYPE
SYNTAX  RowStatus
MAX-ACCESS read-create
STATUS  current
DESCRIPTION
"An object that allows entries in this table to be created
and deleted using the RowStatus convention."
::= { mplsLdpSessionEntry 11 }

--
-- The MPLS LDP Hello Adjacency Table
--

mplsLdpHelloAdjacencyObjects OBJECT IDENTIFIER ::= { mplsLdpObjects 5 }

mplsLdpHelloAdjacencyTable OBJECT-TYPE
SYNTAX  SEQUENCE OF MplsLdpHelloAdjacencyEntry
MAX-ACCESS not-accessible
STATUS  current
DESCRIPTION
"A table of Hello Adjacencies for Sessions."
::= { mplsLdpHelloAdjacencyObjects 1 }

mplsLdpHelloAdjacencyEntry OBJECT-TYPE
SYNTAX  MplsLdpHelloAdjacencyEntry
MAX-ACCESS not-accessible
STATUS  current
DESCRIPTION
"Each row represents a single LDP Hello Adjacency.
An LDP Session can have one or more Hello adjacencies."
INDEX
{ mplsLdpSessionIndex,
  mplsLdpHelloAdjacencyIndex }
::= { mplsLdpHelloAdjacencyTable 1 }

MplsLdpHelloAdjacencyEntry ::= SEQUENCE {
  mplsLdpHelloAdjacencyIndex                  Unsigned32,
  mplsLdpHelloAdjacencyHoldTimeRemaining     TimeInterval
}
mplsLdpHelloAdjacencyIndex OBJECT-TYPE
SYNTAX     Unsigned32 (1..4294967295)
MAX-ACCESS not-accessible
STATUS     current
DESCRIPTION  "An identifier for the adjacency."
::= { mplsLdpHelloAdjacencyEntry 1 }

mplsLdpHelloAdjacencyHoldTimeRemaining OBJECT-TYPE
SYNTAX     TimeInterval
MAX-ACCESS read-only
STATUS     current
DESCRIPTION  "The time remaining for this Hello Adjacency."
::= { mplsLdpHelloAdjacencyEntry 2 }

---
--- Notifications
---

mplsLdpNotificationPrefix OBJECT IDENTIFIER ::= 
{ mplsLdpNotifications 0 }

mplsLdpFailedInitSessionThresholdExceeded NOTIFICATION-TYPE
OBJECTS     
{ mplsLdpNotificationPrefix 1 }

mplsLdpModuleCompliance MODULE-COMPLIANCE
STATUS     current
DESCRIPTION  "The compliance statement for agents that support
the MPLS LDP MIB.

MODULE -- this module

MANDATORY-GROUPS { mplsLdpGeneralGroup,
                          mplsLdpNotificationsGroup }

OBJECT mplsLdpEntityRowStatus
MIN-ACCESS read-only
DESCRIPTION
"The agent is not required to support a SET operation
to this object."

OBJECT mplsLdpPeerRowStatus
MIN-ACCESS read-only
DESCRIPTION
"The agent is not required to support a SET operation
to this object."

::= { mplsLdpCompliances 1 }

-- units of conformance

mplsLdpGeneralGroup OBJECT-GROUP

OBJECTS {
  mplsLdpLsrID,
  mplsLdpLsrLoopDetectionPresent,
  mplsLdpLsrLoopDetectionAdminStatus,
  mplsLdpLsrPathVectorLimit,
  mplsLdpLsrHopCountLimit,
  mplsLdpLsrLoopPreventionPresent,
  mplsLdpLsrLoopPreventionAdminStatus,
  mplsLdpLsrLabelRetentionMode,
  mplsLdpEntityLabelSpaceType,
  mplsLdpEntityDefVpi,
  mplsLdpEntityDefVci,
  mplsLdpEntityUnlabTrafVpi,
  mplsLdpEntityUnlabTrafVci,
  mplsLdpEntityMergeCapability,
  mplsLdpEntityVcDirectionality,
  mplsLdpEntityWellKnownDiscoveryPort,
  mplsLdpEntityMtu,
  mplsLdpEntityKeepAliveHoldTimer,
  mplsLdpEntityFailedInitSessionThreshold,
  mplsLdpEntityLabelDistributionMethod,
  mplsLdpEntityRowStatus,
  mplsLdpEntityConfAtmLabelRangeUpperBoundVPI,
  mplsLdpEntityConfAtmLabelRangeUpperBoundVCI,
  mplsLdpEntityConfAtmLabelRangeRowStatus,
  mplsLdpAttempetedSessions,
  mplsLdpPeerID,
  mplsLdpPeerInternetworkAddrType,
  mplsLdpPeerInternetworkAddr,
mplsLdpPeerDefaultMtu,
mplsLdpPeerKeepAliveHoldTimer,
mplsLdpPeerLabelDistributionMethod,
mplsLdpPeerRowStatus,
mplsLdpPeerConfAtmLabelRangeUpperBoundVPI,
mplsLdpPeerConfAtmLabelRangeUpperBoundVCI,
mplsLdpPeerConfAtmLabelRangeRowStatus,
mplsLdpSessionProtocolVersion,
mplsLdpSessionKeepAliveHoldTimeRemaining,
mplsLdpSessionRole,
mplsLdpSessionState,
mplsLdpSessionAtmLabelRangeLowerBoundVPI,
mplsLdpSessionAtmLabelRangeLowerBoundVCI,
mplsLdpSessionAtmLabelRangeUpperBoundVPI,
mplsLdpSessionAtmLabelRangeUpperBoundVCI,
mplsLdpSessionRowStatus,
mplsLdpHelloAdjacencyHoldTimeRemaining
}

STATUS current
DESCRIPTION
"Objects that apply to all MPLS LDP implementations over ATM."
 ::= { mplsLdpGroups 1 }

mplsLdpNotificationsGroup NOTIFICATION-GROUP
NOTIFICATIONS { mplsLdpFailedInitSessionThresholdExceeded }
STATUS current
DESCRIPTION
"The notification(s) which an MPLS LDP implemention is required to implement."
 ::= { mplsLdpGroups 2 }

END
5. Revision History

This section should be removed when this document is published as an RFC.

5.1. Changes from <draft-ietf-mpls-ldp-mib-00.txt>

Textual conventions were added for the LSR Identifier and the LDP Identifier.

Top-level mib structure was added. The LDP MIB falls under a proposed hierarchy of mpls.mplsProtocols.

The mib hierarchy within the LDP MIB was also changed. A new branch, under mpls.mplsProtocols.mplsLdpMIB.mplsLdpObjects was added. This branch is mplsLdpLsrObjects. Currently, this contains several new scalar objects: mplsLdpLsrID, mplsLdpLsrLoopDetectionPresent, mplsLdpLsrLoopDetectionAdminStatus, mplsLdpLsrPathVectorLimit, mplsLdpLsrHopCountLimit, mplsLdpLsrLoopPreventionPresent, mplsLdpLsrLoopPreventionAdminStatus, and mplsLdpLsrLabelRetentionMode.

mplsLdpEntityTable is now indexed by mplsLdpEntityIdentifier, which is the LDP Identifier used in Session establishment.

mplsLdpEntityLoopDetection and mplsLdpEntityLoopPrevention objects were removed from this table.

The following objects were added to the mplsLdpEntityTable: mplsLdpEntityLabelSpaceType, mplsLdpEntityUnlabTrafVpi, mplsLdpEntityUnlabTrafVci, mplsLdpEntityMergeCapability, mplsLdpEntityVcDirectionality, and mplsLdpEntityLabelDistributionMethod.

The following objects were added to the mplsLdpPeerEntityTable: mplsLdpPeerLabelDistributionMethod.

The following object was removed from the mplsLdpEntityStatsTable: mplsLdpEntityEstablishedSessions.

The LIB table was added.

The following notifications were added.

References were added and revised.

6. TO DO List

This section should be removed when this document is published as an RFC. This section outlines the next areas the authors intend to
address.

- The MIB should be enhanced to support other L2 protocols (e.g. Frame Relay).

- Update this draft to reflect the latest changes to draft-ietf-mpls-ldp-05.txt (or later LDP drafts).

- Update the Introduction section of the draft to reflect all the changes made to the LDP MIB.

- Fix conformance statements.

- Remove the following sections prior to final publication: IANA Considerations Section, Revisions Section and this (TO DO List) Section.

7. Acknowledgments

The authors would like to thank the following people: Leigh McLellan, Geetha Brown, Geping Chen and Charlan Zhou from Nortel Networks, and Zoltan Takacs and Bo Augustsson from Ericsson.
8. References


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


9. Security Considerations

Assuming that secure network management (such as SNMP v3) is implemented, the objects represented in this MIB do not pose a threat to the security of the network.

10. Authors’ Addresses

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11. Full Copyright Statement

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12. IANA Address Family Numbers MIB

This section is copied verbatim from the draft-ietf-ion-nhrp-mib-09.txt[]. This section will be removed in future versions of this draft. This section was copied here to for convenience, as it is IMPORTED into the LDP MIB.

This appendix defines the initial content of the IANA-ADDRESS-FAMILY-NUMBERS-MIB. This section should be removed from this document prior to its approval, at which time this MIB will be administered by IANA.

The branch for this MIB needs to be determined, and an appropriate number should be added where XXX is currently.

IANA-ADDRESS-FAMILY-NUMBERS-MIB DEFINITIONS ::= BEGIN

IMPORTS
MODULE-IDENTITY, mib-2 FROM SNMPv2-SMI
TEXTUAL-CONVENTION FROM SNMPv2-TC;

ianaAddressFamilyNumbers MODULE-IDENTITY
LAST-UPDATED "9905191200Z" -- May 19, 1999
ORGANIZATION "IANA"
CONTACT-INFO
"Postal: Internet Assigned Numbers Authority
USC/Information Sciences Institute
4676 Admiralty Way
Marina del Rey, CA 90292-6695
USA

Expires December 1999
DESCRIPTION
"The MIB module defines the AddressFamilyNumbers
textual convention."

-- revision history

REVISION   "9905191200Z"  -- May 19, 1999
          -- RFC-Editor assigns RFC xxxx
DESCRIPTION "Initial version, published as RFC xxxx."

 ::= ( mib-2 XXX ) -- to be assigned by IANA

AddressFamilyNumbers ::= TEXTUAL-CONVENTION
STATUS       current
DESCRIPTION
"The definition of this textual convention with the
addition of newly assigned values is published
periodically by the IANA, in either the Assigned
Numbers RFC, or some derivative of it specific to
Internet Network Management number assignments.
(The latest arrangements can be obtained by
contacting the IANA.)

The enumerations are described as:

other(0), -- none of the following
ipV4(1),  -- IP Version 4
ipV6(2),  -- IP Version 6
nsap(3),  -- NSAP
hdlc(4),  -- (8-bit multidrop)
bbn1822(5),
all802(6), -- (includes all 802 media
           -- plus Ethernet ‘canonical format’)
e163(7),
e164(8),  -- (SMDS, Frame Relay, ATM)
f69(9),   -- (Telex)
x121(10), -- (X.25, Frame Relay)
ipx(11),  -- IPX (Internet Protocol Exchange)
appletalk(12), -- Apple Talk
decnetIV(13), -- DEC Net Phase IV
banyanVines(14), -- Banyan Vines
e164withNsap(15),
                -- (E.164 with NSAP format subaddress)

reserved(65535)
Requests for new values should be made to IANA via email (iana@isi.edu)."

SYNTAX INTEGER {
    other(0),
    ipV4(1),
    ipV6(2),
    nsap(3),
    hdlc(4),
    bbn1822(5),
    all802(6),
    e163(7),
    e164(8),
    f69(9),
    x121(10),
    ipx(11),
    appletalk(12),
    decnetIV(13),
    banyanVines(14),
    e164withNsap(15),
    reserved(65535)
}

END