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Link Management Protocol (LMP) Management Information Base (MIB)

Status of This Memo

This document specifies an Internet standards track protocol for the Internet community, and requests discussion and suggestions for improvements. Please refer to the current edition of the "Internet Official Protocol Standards" (STD 1) for the standardization state and status of this protocol. Distribution of this memo is unlimited.

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Abstract

This document provides minor corrections to and obsoletes RFC 4327.

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 modeling the Link Management Protocol (LMP).

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1. The Internet-Standard Management Framework

For a detailed overview of the documents that describe the current Internet-Standard Management Framework, please refer to section 7 of RFC 3410 [RFC3410].

Managed objects are accessed via a virtual information store, termed the Management Information Base or MIB. MIB objects are generally accessed through the Simple Network Management Protocol (SNMP). Objects in the MIB are defined using the mechanisms defined in the Structure of Management Information (SMI). This memo specifies a MIB module that is compliant to the SMIV2, which is described in STD 58, RFC 2578 [RFC2578], STD 58, RFC 2579 [RFC2579] and STD 58, RFC 2580 [RFC2580].

2. Introduction

Current work is under way in the IETF to specify a suite of protocols to be used as a common control plane and a separate common measurement plane. Generalized MPLS (GMPLS) [RFC3471] and the Link Management Protocol [RFC4204] are key components of this standardization activity. The primary purpose of LMP is to manage traffic engineering (TE) links. Primary goals of LMP are the maintenance of the control channel connectivity, correlation of link properties, verification of data-bearing links, and detection and isolation of link faults.

We describe in this document a MIB module that can be used to manage LMP implementations. This MIB module covers both configuration and performance-monitoring aspects of LMP.

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].

3. Terminology

This document uses terminology from the document describing the Link Management Protocol [RFC4204]. An "LMP adjacency" is formed between two nodes that support the same capabilities, and LMP messages are exchanged between the node pair over control channels that form this adjacency. Several control channels can be active at the same time. With the exception of messages related to control channel management, anytime an LMP message needs to be transferred to a neighbor node, it can be sent on any of the active control channels. The control channels can also be used to exchange MPLS control plane information or routing information.

LMP is designed to support aggregation of one or more data-bearing links into a traffic-engineering (TE) link. The data-bearing links can be either component links or ports, depending on their multiplexing capability (see [RFC4204] for the distinction between port and component link).

Each TE link is associated with an LMP adjacency, and one or more control channels are used to exchange LMP messages for a particular adjacency. In turn, control channels are used to manage the TE links associated with the LMP adjacency.

4. Feature Checklist

The Link Management Protocol MIB module (LMP-MIB) is designed to satisfy the following requirements and constraints:

- The MIB module supports the enabling and disabling of LMP capability on LMP-capable interfaces of a photonic switch, optical cross-connect, or router.
- The MIB module is used to provide information about LMP adjacencies.
- Support is provided for configuration of the keep-alive and link verification parameters.
- The MIB module is used to express the mapping between local and remote TE links, as well as local and remote interface identifiers for port or component link.
- Performance counters are provided for measuring LMP performance on a per-control channel basis. Performance counters are also provided for measuring LMP performance on the data-bearing links.

Note that the LMP MIB module goes hand-in-hand with the TE Link (TE-LINK-STD-MIB) MIB module [RFC4220]. The TE link table, which is used to associate data-bearing links to TE links, is defined in the TE Link MIB. The TE link table in the LMP MIB module contains TE link information specific to LMP.

5. Outline

Configuring LMP through an optical device involves the following steps:

- Enabling LMP on LMP-capable interfaces through control channel configuration.

- Optionally, specifying link verification parameters.
- Configuring the data-bearing links and associating them to the appropriate TE link (this association is stored in the ifStackTable of the Interfaces Group MIB).

TE links are managed by the control channels that run between the same pair of nodes (LMP adjacency).

6. Brief Description of MIB Objects

Sections 6.1 - 6.8 describe objects pertaining to LMP. The MIB objects were derived from the LMP document [RFC4204].

6.1. lmpNbrTable

The remote node table is used to identify the pair of nodes that exchange LMP messages over control channels.

6.2. lmpControlChannelTable

The control channel table is used for enabling the LMP protocol on LMP-capable interfaces. A photonic switch, optical cross-connect, or router creates an entry in this table for every LMP-capable interface in that device.

6.3. lmpControlChannelPerfTable

The control channel performance table is used for collecting LMP performance counts on a per-control channel basis. Each entry in the lmpControlChannelTable has a corresponding entry in the lmpControlChannelPerfTable.

6.4. lmpTeLinkTable

The TE link table is used for specifying LMP information associated with TE links.

6.5. lmpLinkVerificationTable

The link verification table is used for configuring the LMP link verification parameters of TE links. For every TE link entry in the lmpTeLinkTable that supports the link verification procedure, there is a corresponding entry in the lmpLinkVerificationTable.

6.6. lmpTeLinkPerfTable

The TE link performance table is used for collecting LMP performance counts on a per-TE link basis. Each entry in the lmpTeLinkTable has a corresponding entry in the lmpTeLinkPerfTable.

6.7. lmpDataLinkTable

The data-bearing link table is used to specify the data-bearing links that are associated with TE links.

6.8. lmpDataLinkPerfTable

The data-bearing link performance table is used for collecting LMP performance counts on data-bearing links.

7. Example of LMP Control Channel Setup

In this section, we provide a brief example of using the MIB objects described in Section 9 to set up an LMP control channel. This example is not meant to illustrate every nuance of the MIB module, but it is intended as an aid to understanding some of the key concepts. It is meant to be read after one goes through the MIB itself.

Suppose that one would like to form an LMP adjacency between two nodes using two control channels. Suppose also that there are three data-bearing links. We also assume that the data-bearing links are ports (lambdas) and that the link verification procedure is not enabled. The following example illustrates which rows and corresponding objects might be created to accomplish this.

First, LMP must be enabled between the pair of nodes.

In lmpNbrTable:

```
{
  lmpNbrNodeId           = 'c0000201'H, -- 192.0.2.1
  lmpNbrAdminStatus     = up(1),
  lmpNbrRowStatus       = createAndGo(4),
  lmpNbrStorageType     = nonVolatile(3)
}
```

Then, the control channels must be set up. These are created in the lmpControlChannelTable.

In lmpControlChannelTable:

```
{
  lmpCcId                = 1,
```

```

    lmpCcUnderlyingIfIndex      = 1,
    lmpCcIsIf                   = false(2),
    lmpCcAuthentication         = false(2),
    lmpCcHelloInterval         = 15,
    lmpCcHelloIntervalMin      = 15,
    lmpCcHelloIntervalMax      = 1000,
    lmpCcHelloDeadInterval     = 45,
    lmpCcHelloDeadIntervalMin  = 45,
    lmpCcHelloDeadIntervalMax  = 1000,
    lmpCcAdminStatus           = up(1),
    lmpCcRowStatus              = createAndGo(4),
    lmpCcStorageType           = nonVolatile(3)
}

{
    lmpCcId                      = 2,
    lmpCcUnderlyingIfIndex      = 2,
    lmpCcIsIf                   = false(2),
    lmpCcAuthentication         = false(2),
    lmpCcHelloInterval         = 15,
    lmpCcHelloIntervalMin      = 15,
    lmpCcHelloIntervalMax      = 1000,
    lmpCcHelloDeadInterval     = 45,
    lmpCcHelloDeadIntervalMin  = 45,
    lmpCcHelloDeadIntervalMax  = 1000,
    lmpCcAdminStatus           = up(1),
    lmpCcRowStatus              = createAndGo(4),
    lmpCcStorageType           = nonVolatile(3)
}

```

Next, the three data-bearing links are created. For each data-bearing link, an ifEntry with the same ifIndex needs to be created beforehand.

```

In lmpDataLinkTable:
{
    ifIndex                      = 41,
    lmpDataLinkAddressType       = unknown(0),
    lmpDataLinkIpAddr           = 'H',
    lmpDataLinkRemoteIpAddress  = 'H',
    lmpDataLinkRemoteIfId       = 47,
    lmpDataLinkRowStatus         = createAndGo(4),
    lmpDataLinkStorageType      = nonVolatile(3)
}

{
    ifIndex                      = 43,
    lmpDataLinkAddressType       = unknown(0),

```

```

    lmpDataLinkIpAddr          = 'H,
    lmpDataLinkRemoteIpAddress = 'H,
    lmpDataLinkRemoteIfId     = 42,
    lmpDataLinkRowStatus      = createAndGo(4),
    lmpDataLinkStorageType    = nonVolatile(3)
  }
  {
    ifIndex                    = 44,
    lmpDataLinkAddressType     = unknown(0),
    lmpDataLinkIpAddr         = 'H,
    lmpDataLinkRemoteIpAddress = 'H,
    lmpDataLinkRemoteIfId     = 48,
    lmpDataLinkRowStatus      = createAndGo(4),
    lmpDataLinkStorageType    = nonVolatile(3)
  }
}

```

Note that the data-bearing link type (`lmpDataLinkType`) does not need to be provisioned, as it is automatically populated by the node. The definition of the protection role (primary or secondary) for the data-bearing links is stored in the `componentLinkTable` of the TE Link MIB module [RFC4220].

Then, a TE link is created as an `ifEntry` with `ifType` `teLink` in the `ifTable`.

Once the TE link is created in the `ifTable`, a TE link entry is created in the LMP MIB module to specify TE link information specific to LMP.

```

In lmpTeLinkTable:
{
  ifIndex                    = 20,
  lmpTeLinkVerification      = true(1),
  lmpTeLinkFaultManagement   = true(1),
  lmpTeLinkDwdm              = false(2),
  lmpTeLinkRowStatus         = createAndGo(4),
  lmpTeLinkStorageType       = nonVolatile(3)
}

```

```

and in lmpLinkVerificationTable:
{
  ifIndex                    = 20,
  lmpLinkVerifyInterval      = 100,
  lmpLinkVerifyDeadInterval  = 300,
  lmpLinkVerifyTransportMechanism = j0Trace(3),
  lmpLinkVerifyAllLinks      = true(1),
  lmpLinkVerifyTransmissionRate = 100000,
  lmpLinkVerifyWavelength    = 0,
}

```



```

    lmpLinkVerifyRowStatus      = createAndGo(4),
    lmpLinkVerifyStorageType   = nonVolatile(3)
}

```

The association between the data-bearing links and the TE links is stored in the ifStackTable [RFC2863].

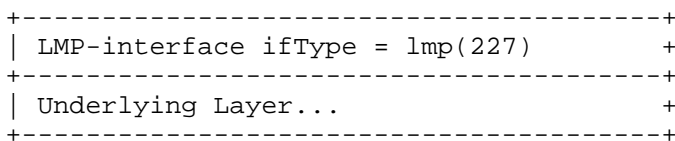
In parallel with the entry created in the lmpTeLinkTable, an entry may be created in the teLinkTable of the TE Link MIB module [RFC4220].

8. Application of the Interfaces Group to LMP

The Interfaces Group [RFC2863] defines generic managed objects for managing interfaces. This memo contains the media-specific extensions to the Interfaces Group for managing LMP control channels that are modeled as interfaces. If the control channel as defined in the lmpControlChannelTable is modeled as an ifEntry, then the following definition applies. An lmpControlChannelTable entry is designated as being represented as an Interfaces MIB ifEntry if the lmpControlChannelEntry object lmpCcIsIf is set to true (1). In this case, the control channel SHOULD be modeled as an ifEntry and provide appropriate interface stacking, as defined below.

This memo assumes the interpretation of the Interfaces Group to be in accordance with [RFC2863], which states that the interfaces table (ifTable) contains information on the managed resource's interfaces and that each sub-layer below the internetwork layer of a network interface is considered an interface. Since the LMP interface only carries control traffic, it is considered to be below the internetwork layer. Thus, the LMP interface may be represented as an entry in the ifTable. The interrelation of entries in the ifTable is defined by Interfaces Stack Group defined in [RFC2863].

When LMP control channels are modeled as interfaces, the interface stack table must appear as follows for the LMP control channel interfaces:



In the above diagram, "Underlying Layer..." refers to the ifIndex of any interface type over which the LMP interface will transmit its traffic. Note that if the underlying layer provides multiple access

to its media (i.e., Ethernet), then it is possible to stack multiple LMP interfaces on top of this interface in parallel.

Note that it is not a requirement that LMP control channels be modeled as interfaces. It is acceptable that control channels simply exist as logical connections between adjacent LMP-capable nodes. In this case, `lmpCcIsIf` is set to `false(2)`, and no corresponding entry is made in the `ifTable`.

8.1. Support of the LMP Layer by `ifTable`

Some specific interpretations of `ifTable` for the LMP layer follow.

<code>Object</code>	Use for the LMP layer.
<code>ifIndex</code>	Each LMP interface may be represented by an <code>ifEntry</code> .
<code>ifDescr</code>	Description of the LMP interface.
<code>ifType</code>	The value that is allocated for LMP is 227. This number has been assigned by the IANA.
<code>ifSpeed</code>	The total bandwidth in bits per second for use by the LMP layer.
<code>ifPhysAddress</code>	Unused.
<code>ifAdminStatus</code>	This variable indicates the administrator's intent as to whether LMP should be enabled, disabled, or running in some diagnostic testing mode on this interface. Also see [RFC2863].
<code>ifOperStatus</code>	This value reflects the actual or operational status of LMP on this interface.
<code>ifLastChange</code>	See [RFC2863].
<code>ifInOctets</code>	The number of received octets over the interface; i.e., the number of octets received as LMP packets.
<code>ifOutOctets</code>	The number of transmitted octets over the interface; i.e., the number of octets transmitted as LMP packets.
<code>ifInErrors</code>	The number of LMP packets dropped due to uncorrectable errors.

ifInUnknownProtos
The number of received packets discarded during packet header validation, including packets with unrecognized label values.

ifOutErrors See [RFC2863].

ifName Textual name (unique on this system) of the interface or an octet string of zero length.

ifLinkUpDownTrapEnable
Default is disabled (2).

ifConnectorPresent
Set to false (2).

ifHighSpeed See [RFC2863].

ifHCInOctets The 64-bit version of ifInOctets; supported if required by the compliance statements in [RFC2863].

ifHCOctets The 64-bit version of ifOutOctets; supported if required by the compliance statements in [RFC2863].

ifAlias The nonvolatile 'alias' name for the interface, as specified by a network manager.

ifCounterDiscontinuityTime
See [RFC2863].

9. LMP MIB Module Definitions

This MIB module IMPORTS objects from [RFC2578], [RFC2579], [RFC2580], [RFC2863], [RFC4001], and [RFC4220], and it has REFERENCE clauses to [RFC4204], [RFC4207], [RFC4209], [RFC3471], and [RFC2914].

LMP-MIB DEFINITIONS ::= BEGIN

IMPORTS

MODULE-IDENTITY, OBJECT-TYPE, NOTIFICATION-TYPE,
transmission, Unsigned32, Counter32, TimeTicks
FROM SNMPv2-SMI -- RFC 2578

MODULE-COMPLIANCE, OBJECT-GROUP, NOTIFICATION-GROUP
FROM SNMPv2-CONF -- RFC 2580

TEXTUAL-CONVENTION, TruthValue, RowStatus, StorageType,
TimeStamp

```
FROM SNMPv2-TC -- RFC 2579

InterfaceIndexOrZero, ifIndex
FROM IF-MIB -- RFC 2863

InetAddressType, InetAddress
FROM INET-ADDRESS-MIB -- RFC 4001

teLinkRemoteIpAddr, teLinkIncomingIfId, TeLinkEncodingType
FROM TE-LINK-STD-MIB; -- RFC 4220

ImpMIB MODULE-IDENTITY
LAST-UPDATED "200608140000Z" -- 14 August 2006
ORGANIZATION "Common Control and Measurement Protocols (CCAMP)
              Working Group"
CONTACT-INFO
    "
      Martin Dubuc
      Email: dubuc.consulting@sympatico.ca

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      Adrian Farrel
      Email: adrian@olddog.co.uk"

DESCRIPTION
    "Copyright (C) 2006 The Internet Society. This version of
    the MIB module is part of RFC 4631; see the RFC itself
    for full legal notices.

    This MIB module contains managed object definitions for
    the Link Management Protocol (LMP) as
    defined in 'Link Management Protocol'."

-- Revision history.
REVISION
    "200608140000Z" -- 14 August 2006
DESCRIPTION
    "Revised version:
    - Fixes textual descriptions of TruthValue settings such that
      True is always 1 and False is always 2.
    - Adds punctuation to REFERENCE clauses.
```

```
        This revision published as RFC 4631"
REVISION
    "200601110000Z" -- 11 January 2006
DESCRIPTION
    "Initial version published as RFC 4327"
 ::= { transmission 227 }

-- Textual Conventions

LmpInterval ::= TEXTUAL-CONVENTION
    DISPLAY-HINT "d"
    STATUS      current
    DESCRIPTION
        "The interval delay, in milliseconds."
    SYNTAX      Unsigned32 (1..65535)

LmpRetransmitInterval ::= TEXTUAL-CONVENTION
    DISPLAY-HINT "d"
    STATUS      current
    DESCRIPTION
        "The retransmission interval delay in milliseconds."
    SYNTAX      Unsigned32 (1..4294967295)

LmpNodeId ::= TEXTUAL-CONVENTION
    DISPLAY-HINT "1d.1d.1d.1d"
    STATUS      current
    DESCRIPTION
        "Represents a Node ID in network byte order. Node ID is an
         address of type IPv4."
    REFERENCE
        "Section 1.1 of Link Management Protocol, RFC 4204."
    SYNTAX      OCTET STRING(SIZE(4))

-- Top level components of this MIB

-- Notifications
lmpNotifications OBJECT IDENTIFIER ::= { lmpMIB 0 }
-- Tables, Scalars
lmpObjects      OBJECT IDENTIFIER ::= { lmpMIB 1 }
-- Conformance
lmpConformance  OBJECT IDENTIFIER ::= { lmpMIB 2 }

lmpAdminStatus OBJECT-TYPE
    SYNTAX      INTEGER { up(1), down(2) }
    MAX-ACCESS  read-write
    STATUS      current
    DESCRIPTION
        "The desired operational status of LMP on the node.
```

Implementations should save the value of this object in persistent memory so that it survives restarts or reboot."

```
DEFVAL      { up }
 ::= { lmpObjects 1 }
```

```
lmpOperStatus OBJECT-TYPE
  SYNTAX      INTEGER { up(1), down(2) }
  MAX-ACCESS  read-only
  STATUS      current
  DESCRIPTION
    "The actual operational status of LMP on the node."
 ::= { lmpObjects 2 }
```

-- LMP Neighbor Table

```
lmpNbrTable OBJECT-TYPE
  SYNTAX      SEQUENCE OF LmpNbrEntry
  MAX-ACCESS  not-accessible
  STATUS      current
  DESCRIPTION
    "This table specifies the neighbor node(s) to which control
    channels may be established."
 ::= { lmpObjects 3 }
```

```
lmpNbrEntry OBJECT-TYPE
  SYNTAX      LmpNbrEntry
  MAX-ACCESS  not-accessible
  STATUS      current
  DESCRIPTION
    "An entry in this table is created by a LMP-enabled device for
    every pair of nodes that can establish control channels."
  INDEX       { lmpNbrNodeId }
 ::= { lmpNbrTable 1 }
```

```
LmpNbrEntry ::= SEQUENCE {
  lmpNbrNodeId          LmpNodeId,
  lmpNbrRetransmitInterval LmpRetransmitInterval,
  lmpNbrRetryLimit      Unsigned32,
  lmpNbrRetransmitDelta Unsigned32,
  lmpNbrAdminStatus     INTEGER,
  lmpNbrOperStatus      INTEGER,
  lmpNbrRowStatus       RowStatus,
  lmpNbrStorageType     StorageType
}
```

```
lmpNbrNodeId OBJECT-TYPE
  SYNTAX      LmpNodeId
```

```
MAX-ACCESS      not-accessible
STATUS          current
DESCRIPTION
    "This is a unique index for an entry in the LmpNbrTable.
     This value represents the remote Node ID."
 ::= { lmpNbrEntry 1 }

lmpNbrRetransmitInterval OBJECT-TYPE
SYNTAX          LmpRetransmitInterval
MAX-ACCESS      read-create
STATUS          current
DESCRIPTION
    "This object specifies the initial retransmission interval that
     is used for the retransmission of messages that require
     acknowledgement.  This object, along with lmpNbrRetryLimit,
     is used to implement the congestion-handling mechanism defined
     in Section 10 of the Link Management Protocol specification,
     which is based on RFC 2914."
REFERENCE
    "Link Management Protocol, RFC 4204.

     Congestion Control Principles, RFC 2914."
DEFVAL          { 500 }
 ::= { lmpNbrEntry 2 }

lmpNbrRetryLimit OBJECT-TYPE
SYNTAX          Unsigned32
MAX-ACCESS      read-create
STATUS          current
DESCRIPTION
    "This object specifies the maximum number of times a message
     is transmitted without being acknowledged.  A value of 0 is used
     to indicate that a node should never stop retransmission.
     This object, along with lmpNbrRetransmitInterval, is
     used to implement the congestion-handling mechanism as defined
     in Section 10 of the Link Management Protocol specification,
     which is based on RFC 2914."
REFERENCE
    "Link Management Protocol, RFC 4204.

     Congestion Control Principles, RFC 2914."
DEFVAL          { 3 }
 ::= { lmpNbrEntry 3 }

lmpNbrRetransmitDelta OBJECT-TYPE
SYNTAX          Unsigned32
MAX-ACCESS      read-create
STATUS          current
DESCRIPTION
```

"This object governs the speed with which the sender increases the retransmission interval, as explained in Section 10 of the Link Management Protocol specification, which is based on RFC 2914. This value is a power used to express the exponential backoff. The ratio of two successive retransmission intervals is (1 + Delta)."

REFERENCE

"Link Management Protocol, RFC 4204.
Congestion Control Principles, RFC 2914."

DEFVAL { 1 }
 ::= { lmpNbrEntry 4 }

lmpNbrAdminStatus OBJECT-TYPE

SYNTAX INTEGER { up(1), down(2) }

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"The desired operational status of LMP to this remote node."

::= { lmpNbrEntry 5 }

lmpNbrOperStatus OBJECT-TYPE

SYNTAX INTEGER { up(1), down(2) }

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The actual operational status of LMP to this remote node."

::= { lmpNbrEntry 6 }

lmpNbrRowStatus OBJECT-TYPE

SYNTAX RowStatus

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"This variable is used to create, modify, and/or delete a row in this table. None of the writable objects in a row can be changed if the status is active(1). All read-create objects must have valid and consistent values before the row can be activated."

::= { lmpNbrEntry 7 }

lmpNbrStorageType OBJECT-TYPE

SYNTAX StorageType

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"The storage type for this conceptual row in the lmpNbrTable. Conceptual rows having the value 'permanent' need not allow write-access to any


```
        columnar object in the row."
DEFVAL      { nonVolatile }
 ::= { lmpNbrEntry 8 }

-- End of lmpNbrTable

lmpCcHelloIntervalDefault OBJECT-TYPE
SYNTAX      LmpInterval
MAX-ACCESS  read-write
STATUS      current
DESCRIPTION
    "This object specifies the default value for the HelloInterval
    parameter used in the Hello protocol keep-alive phase.  It
    indicates how frequently LMP Hello messages will be sent.  It
    is used as the default value for lmpCcHelloInterval.
    Implementations should save the value of this object in
    persistent memory so that it survives restarts or reboot."
REFERENCE
    "Link Management Protocol, RFC 4204."
 ::= { lmpObjects 4 }

lmpCcHelloIntervalDefaultMin OBJECT-TYPE
SYNTAX      LmpInterval
MAX-ACCESS  read-write
STATUS      current
DESCRIPTION
    "This object specifies the default minimum value for the
    HelloInterval parameter.  It is used as a default value
    for lmpCcHelloIntervalMin.  Implementations should save the
    value of this object in persistent memory so that it survives
    restarts or reboot."
 ::= { lmpObjects 5 }

lmpCcHelloIntervalDefaultMax OBJECT-TYPE
SYNTAX      LmpInterval
MAX-ACCESS  read-write
STATUS      current
DESCRIPTION
    "This object specifies the default maximum value for the
    HelloInterval parameter.  It is used as a default value
    for lmpCcHelloIntervalMax.  Implementations should save the
    value of this object in persistent memory so that it survives
    restarts or reboot."
 ::= { lmpObjects 6 }

lmpCcHelloDeadIntervalDefault OBJECT-TYPE
SYNTAX      LmpInterval
MAX-ACCESS  read-write
```

```
STATUS          current
DESCRIPTION
  "This object specifies the default HelloDeadInterval parameter
  to use in the Hello protocol keep-alive phase.  It indicates
  how long a device should wait before declaring the control
  channel dead.  The HelloDeadInterval parameter should be at
  least three times the value of HelloInterval.  It is used as
  a default value for lmpCcHelloDeadInterval.  Implementations
  should save the value of this object in persistent memory so
  that it survives restarts or reboot."
REFERENCE
  "Link Management Protocol, RFC 4204."
 ::= { lmpObjects 7 }
```

```
lmpCcHelloDeadIntervalDefaultMin OBJECT-TYPE
```

```
SYNTAX          LmpInterval
MAX-ACCESS      read-write
STATUS          current
DESCRIPTION
  "This object specifies the default minimum value for the
  HelloDeadInterval parameter.  It is used as a default value
  for lmpCcHelloDeadIntervalMin.  Implementations should save
  the value of this object in persistent memory so that it
  survives restarts or reboot."
 ::= { lmpObjects 8 }
```

```
lmpCcHelloDeadIntervalDefaultMax OBJECT-TYPE
```

```
SYNTAX          LmpInterval
MAX-ACCESS      read-write
STATUS          current
DESCRIPTION
  "This object specifies the default maximum value for the
  HelloDeadInterval parameter.  It is used as a default value
  for lmpCcHelloDeadIntervalMax.  Implementations should save the
  value of this object in persistent memory so that it survives
  restarts or reboot."
 ::= { lmpObjects 9 }
```

```
-- LMP Control Channel Table
```

```
lmpControlChannelTable OBJECT-TYPE
```

```
SYNTAX          SEQUENCE OF LmpControlChannelEntry
MAX-ACCESS      not-accessible
STATUS          current
DESCRIPTION
  "This table specifies LMP control channel information."
 ::= { lmpObjects 10 }
```

```

lmpControlChannelEntry OBJECT-TYPE
    SYNTAX          LmpControlChannelEntry
    MAX-ACCESS      not-accessible
    STATUS          current
    DESCRIPTION
        "An entry in this table is created by an LMP-enabled device for
        every control channel. Whenever a new entry is created with
        lmpCcIsIf set to true(1), a corresponding entry is
        created in ifTable as well (see RFC 2863)."

```

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"If lmpCcIsIf is set to true(1), this object carries the index into the ifTable of the entry that represents the LMP interface over which LMP will transmit its traffic. If this object is set to zero but lmpCcIsIf is set to true(1), the control channel is not currently associated with any underlying interface, and the control channel's operational status must not be up(1); nor should the control channel forward or receive traffic. If lmpCcIsIf is set to false(2), this object should be set to zero and ignored."

::= { lmpControlChannelEntry 2 }

lmpCcIsIf OBJECT-TYPE

SYNTAX TruthValue

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"In implementations where the control channels are modeled as interfaces, the value of this object is true(1), and this control channel is represented by an interface in the interfaces group table as indicated by the value of lmpCcUnderlyingIfIndex. If control channels are not modeled as interfaces, the value of this object is false(2), and there is no corresponding interface for this control channel in the interfaces group table; the value of lmpCcUnderlyingIfIndex should be ignored."

::= { lmpControlChannelEntry 3 }

lmpCcNbrNodeId OBJECT-TYPE

SYNTAX LmpNodeId

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"This is the Node ID of the control channel remote node. This value either is configured or gets created by the node when a Config message is received or when an outgoing Config message is acknowledged by the remote node."

::= { lmpControlChannelEntry 4 }

lmpCcRemoteId OBJECT-TYPE

SYNTAX Unsigned32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"This value represents the remote control channel identifier (32-bit number). It is determined during the negotiation phase. A value of zero means that the remote control channel identifier has not yet been learned."

```
::= { lmpControlChannelEntry 5 }
```

lmpCcRemoteAddressType OBJECT-TYPE

```
SYNTAX      InetAddressType
MAX-ACCESS  read-create
STATUS      current
DESCRIPTION
```

"This value represents the remote control channel IP address type. In point-to-point configuration, this value can be set to unknown(0)."

```
::= { lmpControlChannelEntry 6 }
```

lmpCcRemoteIpAddr OBJECT-TYPE

```
SYNTAX      InetAddress
MAX-ACCESS  read-create
STATUS      current
DESCRIPTION
```

"This value represents the remote control channel Internet address for numbered control channel. The type of this address is determined by lmpCcRemoteAddressType. The control channel must be numbered on non-point-to-point configuration. For point-to-point configuration, the remote control channel address can be of type unknown, in which case this object must be a zero-length string. The lmpCcRemoteId object then identifies the unnumbered address."

```
::= { lmpControlChannelEntry 7 }
```

lmpCcSetupRole OBJECT-TYPE

```
SYNTAX      INTEGER { active(1), passive(2) }
MAX-ACCESS  read-create
STATUS      current
DESCRIPTION
```

"The role that this node should take during establishment of this control channel. An active node will initiate establishment. A passive node will wait for the remote node to initiate. A pair of nodes that both take the passive role will never establish communications."

```
DEFVAL      { active }
::= { lmpControlChannelEntry 8 }
```

lmpCcAuthentication OBJECT-TYPE

```
SYNTAX      TruthValue
MAX-ACCESS  read-create
```

```
STATUS          current
DESCRIPTION
    "This object indicates whether the control channel must use
    authentication."
REFERENCE
    "Link Management Protocol, RFC 4204."
 ::= { lmpControlChannelEntry 9 }

lmpCcHelloInterval OBJECT-TYPE
SYNTAX          LmpInterval
MAX-ACCESS      read-create
STATUS          current
DESCRIPTION
    "This object specifies the value of the HelloInterval
    parameter. The default value for this object should be
    set to lmpCcHelloIntervalDefault."
 ::= { lmpControlChannelEntry 10 }

lmpCcHelloIntervalMin OBJECT-TYPE
SYNTAX          LmpInterval
MAX-ACCESS      read-create
STATUS          current
DESCRIPTION
    "This object specifies the minimum value for the
    HelloInterval parameter. The default value for this
    object should be set to lmpCcHelloIntervalMinDefault."
 ::= { lmpControlChannelEntry 11 }

lmpCcHelloIntervalMax OBJECT-TYPE
SYNTAX          LmpInterval
MAX-ACCESS      read-create
STATUS          current
DESCRIPTION
    "This object specifies the maximum value for the
    HelloInterval parameter. The default value for this
    object should be set to lmpCcHelloIntervalMaxDefault."
 ::= { lmpControlChannelEntry 12 }

lmpCcHelloIntervalNegotiated OBJECT-TYPE
SYNTAX          LmpInterval
MAX-ACCESS      read-only
STATUS          current
DESCRIPTION
    "Once the control channel is active, this object represents
    the negotiated HelloInterval value."
 ::= { lmpControlChannelEntry 13 }

lmpCcHelloDeadInterval OBJECT-TYPE
```

```
SYNTAX          LmpInterval
MAX-ACCESS      read-create
STATUS          current
DESCRIPTION
    "This object specifies the value of the HelloDeadInterval
    parameter. The default value for this object should be
    set to lmpCcHelloDeadIntervalDefault."
 ::= { lmpControlChannelEntry 14 }

lmpCcHelloDeadIntervalMin OBJECT-TYPE
SYNTAX          LmpInterval
MAX-ACCESS      read-create
STATUS          current
DESCRIPTION
    "This object specifies the minimum value for the
    HelloDeadInterval parameter. The default value for this
    object should be set to lmpCcHelloDeadIntervalMinDefault."
 ::= { lmpControlChannelEntry 15 }

lmpCcHelloDeadIntervalMax OBJECT-TYPE
SYNTAX          LmpInterval
MAX-ACCESS      read-create
STATUS          current
DESCRIPTION
    "This object specifies the maximum value for the
    HelloDeadInterval parameter. The default value for this
    object should be set to lmpCcHelloIntervalMaxDefault."
 ::= { lmpControlChannelEntry 16 }

lmpCcHelloDeadIntervalNegotiated OBJECT-TYPE
SYNTAX          LmpInterval
MAX-ACCESS      read-only
STATUS          current
DESCRIPTION
    "Once the control channel is active, this object represents
    the negotiated HelloDeadInterval value."
 ::= { lmpControlChannelEntry 17 }

lmpCcLastChange OBJECT-TYPE
SYNTAX          TimeTicks
MAX-ACCESS      read-only
STATUS          current
DESCRIPTION
    "The value of sysUpTime at the time the control channel entered
    its current operational state. If the current state was
    entered prior to the last re-initialization of the local
    network management subsystem, then this object contains a
    zero value."
```

```

 ::= { lmpControlChannelEntry 18 }

lmpCcAdminStatus OBJECT-TYPE
    SYNTAX      INTEGER { up(1), down(2) }
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "The desired operational status of this control channel."
 ::= { lmpControlChannelEntry 19 }

lmpCcOperStatus OBJECT-TYPE
    SYNTAX      INTEGER {
        up(1),
        down(2),
        configSnd(3),
        configRcv(4),
        active(5),
        goingDown(6)
    }
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The actual operational status of this control channel."
 ::= { lmpControlChannelEntry 20 }

lmpCcRowStatus OBJECT-TYPE
    SYNTAX      RowStatus
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "This variable is used to create, modify, and/or
        delete a row in this table.  None of the writable objects
        in a row can be changed if the status is active(1).
        All read-create objects must have valid and consistent
        values before the row can be activated."
 ::= { lmpControlChannelEntry 21 }

lmpCcStorageType OBJECT-TYPE
    SYNTAX      StorageType
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "The storage type for this conceptual row in the
        lmpControlChannelTable.  Conceptual rows having the value
        'permanent' need not allow write-access to any
        columnar object in the row."

    DEFVAL      { nonVolatile }

```



```

 ::= { lmpControlChannelEntry 22 }

-- End of lmpControlChannelTable

-- LMP Control Channel Performance Table

lmpControlChannelPerfTable OBJECT-TYPE
    SYNTAX          SEQUENCE OF LmpControlChannelPerfEntry
    MAX-ACCESS      not-accessible
    STATUS          current
    DESCRIPTION
        "This table specifies LMP control channel performance
         counters."
    ::= { lmpObjects 11 }

lmpControlChannelPerfEntry OBJECT-TYPE
    SYNTAX          LmpControlChannelPerfEntry
    MAX-ACCESS      not-accessible
    STATUS          current
    DESCRIPTION
        "An entry in this table is created by a LMP-enabled device for
         every control channel. lmpCcCounterDiscontinuityTime is used
         to indicate potential discontinuity for all counter objects
         in this table."
    INDEX          { lmpCcId }
    ::= { lmpControlChannelPerfTable 1 }

LmpControlChannelPerfEntry ::= SEQUENCE {
    lmpCcInOctets          Counter32,
    lmpCcInDiscards       Counter32,
    lmpCcInErrors         Counter32,
    lmpCcOutOctets        Counter32,
    lmpCcOutDiscards      Counter32,
    lmpCcOutErrors        Counter32,
    lmpCcConfigReceived   Counter32,
    lmpCcConfigSent       Counter32,
    lmpCcConfigRetransmit Counter32,
    lmpCcConfigAckReceived Counter32,
    lmpCcConfigAckSent    Counter32,
    lmpCcConfigNackReceived Counter32,
    lmpCcConfigNackSent   Counter32,
    lmpCcHelloReceived    Counter32,
    lmpCcHelloSent        Counter32,
    lmpCcBeginVerifyReceived Counter32,
    lmpCcBeginVerifySent   Counter32,
    lmpCcBeginVerifyRetransmit Counter32,
    lmpCcBeginVerifyAckReceived Counter32,

```

```

lmpCcBeginVerifyAckSent      Counter32,
lmpCcBeginVerifyNackReceived Counter32,
lmpCcBeginVerifyNackSent    Counter32,
lmpCcEndVerifyReceived      Counter32,
lmpCcEndVerifySent          Counter32,
lmpCcEndVerifyRetransmit    Counter32,
lmpCcEndVerifyAckReceived   Counter32,
lmpCcEndVerifyAckSent       Counter32,
lmpCcTestStatusSuccessReceived Counter32,
lmpCcTestStatusSuccessSent  Counter32,
lmpCcTestStatusSuccessRetransmit Counter32,
lmpCcTestStatusFailureReceived Counter32,
lmpCcTestStatusFailureSent  Counter32,
lmpCcTestStatusFailureRetransmit Counter32,
lmpCcTestStatusAckReceived  Counter32,
lmpCcTestStatusAckSent     Counter32,
lmpCcLinkSummaryReceived    Counter32,
lmpCcLinkSummarySent        Counter32,
lmpCcLinkSummaryRetransmit  Counter32,
lmpCcLinkSummaryAckReceived Counter32,
lmpCcLinkSummaryAckSent     Counter32,
lmpCcLinkSummaryNackReceived Counter32,
lmpCcLinkSummaryNackSent    Counter32,
lmpCcChannelStatusReceived  Counter32,
lmpCcChannelStatusSent      Counter32,
lmpCcChannelStatusRetransmit Counter32,
lmpCcChannelStatusAckReceived Counter32,
lmpCcChannelStatusAckSent   Counter32,
lmpCcChannelStatusReqReceived Counter32,
lmpCcChannelStatusReqSent   Counter32,
lmpCcChannelStatusReqRetransmit Counter32,
lmpCcChannelStatusRspReceived Counter32,
lmpCcChannelStatusRspSent   Counter32,
lmpCcCounterDiscontinuityTime TimeStamp
}

```

```

lmpCcInOctets OBJECT-TYPE
    SYNTAX      Counter32
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The total number of LMP message octets received on the
        control channel."
    ::= { lmpControlChannelPerfEntry 1 }

```

```

lmpCcInDiscards OBJECT-TYPE
    SYNTAX      Counter32
    MAX-ACCESS  read-only

```

```
STATUS      current
DESCRIPTION
    "The number of inbound packets that were chosen to be
    discarded even though no errors had been detected.  One
    possible reason for discarding such a packet could be to
    free up buffer space."
 ::= { lmpControlChannelPerfEntry 2 }

lmpCcInErrors OBJECT-TYPE
SYNTAX      Counter32
MAX-ACCESS  read-only
STATUS      current
DESCRIPTION
    "The number of inbound packets that contained errors
    preventing them from being processed by LMP."
 ::= { lmpControlChannelPerfEntry 3 }

lmpCcOutOctets OBJECT-TYPE
SYNTAX      Counter32
MAX-ACCESS  read-only
STATUS      current
DESCRIPTION
    "The total number of LMP message octets transmitted out of
    the control channel."
 ::= { lmpControlChannelPerfEntry 4 }

lmpCcOutDiscards OBJECT-TYPE
SYNTAX      Counter32
MAX-ACCESS  read-only
STATUS      current
DESCRIPTION
    "The number of outbound packets that were chosen to be
    discarded even though no errors had been detected to
    prevent their being transmitted.  One possible reason
    for discarding such a packet could be to free up buffer
    space."
 ::= { lmpControlChannelPerfEntry 5 }

lmpCcOutErrors OBJECT-TYPE
SYNTAX      Counter32
MAX-ACCESS  read-only
STATUS      current
DESCRIPTION
    "The number of outbound packets that could not be
    transmitted because of errors."
 ::= { lmpControlChannelPerfEntry 6 }

lmpCcConfigReceived OBJECT-TYPE
```

```
SYNTAX          Counter32
MAX-ACCESS      read-only
STATUS          current
DESCRIPTION
    "This object counts the number of Config messages that have
    been received on this control channel."
 ::= { lmpControlChannelPerfEntry 7 }

lmpCcConfigSent OBJECT-TYPE
SYNTAX          Counter32
MAX-ACCESS      read-only
STATUS          current
DESCRIPTION
    "This object counts the number of Config messages that have
    been sent on this control channel."
 ::= { lmpControlChannelPerfEntry 8 }

lmpCcConfigRetransmit OBJECT-TYPE
SYNTAX          Counter32
MAX-ACCESS      read-only
STATUS          current
DESCRIPTION
    "This object counts the number of Config messages that
    have been retransmitted over this control channel."
 ::= { lmpControlChannelPerfEntry 9 }

lmpCcConfigAckReceived OBJECT-TYPE
SYNTAX          Counter32
MAX-ACCESS      read-only
STATUS          current
DESCRIPTION
    "This object counts the number of ConfigAck messages that have
    been received on this control channel."
 ::= { lmpControlChannelPerfEntry 10 }

lmpCcConfigAckSent OBJECT-TYPE
SYNTAX          Counter32
MAX-ACCESS      read-only
STATUS          current
DESCRIPTION
    "This object counts the number of ConfigAck messages that have
    been sent on this control channel."
 ::= { lmpControlChannelPerfEntry 11 }

lmpCcConfigNackReceived OBJECT-TYPE
SYNTAX          Counter32
MAX-ACCESS      read-only
STATUS          current
```

DESCRIPTION

"This object counts the number of ConfigNack messages that have been received on this control channel."

::= { lmpControlChannelPerfEntry 12 }

lmpCcConfigNackSent OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"This object counts the number of ConfigNack messages that have been sent on this control channel."

::= { lmpControlChannelPerfEntry 13 }

lmpCcHelloReceived OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"This object counts the number of Hello messages that have been received on this control channel."

::= { lmpControlChannelPerfEntry 14 }

lmpCcHelloSent OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"This object counts the number of Hello messages that have been sent on this control channel."

::= { lmpControlChannelPerfEntry 15 }

lmpCcBeginVerifyReceived OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"This object counts the number of BeginVerify messages that have been received on this control channel."

::= { lmpControlChannelPerfEntry 16 }

lmpCcBeginVerifySent OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"This object counts the number of BeginVerify messages that have been sent on this control channel."

```
 ::= { lmpControlChannelPerfEntry 17 }

lmpCcBeginVerifyRetransmit OBJECT-TYPE
    SYNTAX      Counter32
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "This object counts the number of BeginVerify messages that
         have been retransmitted over this control channel."
    ::= { lmpControlChannelPerfEntry 18 }

lmpCcBeginVerifyAckReceived OBJECT-TYPE
    SYNTAX      Counter32
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "This object counts the number of BeginVerifyAck messages that
         have been received on this control channel."
    ::= { lmpControlChannelPerfEntry 19 }

lmpCcBeginVerifyAckSent OBJECT-TYPE
    SYNTAX      Counter32
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "This object counts the number of BeginVerifyAck messages that
         have been sent on this control channel."
    ::= { lmpControlChannelPerfEntry 20 }

lmpCcBeginVerifyNackReceived OBJECT-TYPE
    SYNTAX      Counter32
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "This object counts the number of BeginVerifyNack messages that
         have been received on this control channel."
    ::= { lmpControlChannelPerfEntry 21 }

lmpCcBeginVerifyNackSent OBJECT-TYPE
    SYNTAX      Counter32
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "This object counts the number of BeginVerifyNack messages that
         have been sent on this control channel."
    ::= { lmpControlChannelPerfEntry 22 }

lmpCcEndVerifyReceived OBJECT-TYPE
```

```
SYNTAX          Counter32
MAX-ACCESS      read-only
STATUS          current
DESCRIPTION
    "This object counts the number of EndVerify messages that have
    been received on this control channel."
 ::= { lmpControlChannelPerfEntry 23 }

lmpCcEndVerifySent OBJECT-TYPE
SYNTAX          Counter32
MAX-ACCESS      read-only
STATUS          current
DESCRIPTION
    "This object counts the number of EndVerify messages that have
    been sent on this control channel."
 ::= { lmpControlChannelPerfEntry 24 }

lmpCcEndVerifyRetransmit OBJECT-TYPE
SYNTAX          Counter32
MAX-ACCESS      read-only
STATUS          current
DESCRIPTION
    "This object counts the number of EndVerify messages that
    have been retransmitted over this control channel."
 ::= { lmpControlChannelPerfEntry 25 }

lmpCcEndVerifyAckReceived OBJECT-TYPE
SYNTAX          Counter32
MAX-ACCESS      read-only
STATUS          current
DESCRIPTION
    "This object counts the number of EndVerifyAck messages that
    have been received on this control channel."
 ::= { lmpControlChannelPerfEntry 26 }

lmpCcEndVerifyAckSent OBJECT-TYPE
SYNTAX          Counter32
MAX-ACCESS      read-only
STATUS          current
DESCRIPTION
    "This object counts the number of EndVerifyAck messages that
    have been sent on this control channel."
 ::= { lmpControlChannelPerfEntry 27 }

lmpCcTestStatusSuccessReceived OBJECT-TYPE
SYNTAX          Counter32
MAX-ACCESS      read-only
STATUS          current
```

DESCRIPTION

"This object counts the number of TestStatusSuccess messages that have been received on this control channel."
 ::= { lmpControlChannelPerfEntry 28 }

lmpCcTestStatusSuccessSent OBJECT-TYPE

SYNTAX Counter32
MAX-ACCESS read-only
STATUS current

DESCRIPTION

"This object counts the number of TestStatusSuccess messages that have been sent on this control channel."
 ::= { lmpControlChannelPerfEntry 29 }

lmpCcTestStatusSuccessRetransmit OBJECT-TYPE

SYNTAX Counter32
MAX-ACCESS read-only
STATUS current

DESCRIPTION

"This object counts the number of TestStatusSuccess messages that have been retransmitted over this control channel."
 ::= { lmpControlChannelPerfEntry 30 }

lmpCcTestStatusFailureReceived OBJECT-TYPE

SYNTAX Counter32
MAX-ACCESS read-only
STATUS current

DESCRIPTION

"This object counts the number of TestStatusFailure messages that have been received on this control channel."
 ::= { lmpControlChannelPerfEntry 31 }

lmpCcTestStatusFailureSent OBJECT-TYPE

SYNTAX Counter32
MAX-ACCESS read-only
STATUS current

DESCRIPTION

"This object counts the number of TestStatusFailure messages that have been sent on this control channel."
 ::= { lmpControlChannelPerfEntry 32 }

lmpCcTestStatusFailureRetransmit OBJECT-TYPE

SYNTAX Counter32
MAX-ACCESS read-only
STATUS current

DESCRIPTION

"This object counts the number of TestStatusFailure messages that have been retransmitted over this control channel."


```
 ::= { lmpControlChannelPerfEntry 33 }

lmpCcTestStatusAckReceived OBJECT-TYPE
    SYNTAX      Counter32
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "This object counts the number of TestStatusAck messages
         that have been received on this control channel."
    ::= { lmpControlChannelPerfEntry 34 }

lmpCcTestStatusAckSent OBJECT-TYPE
    SYNTAX      Counter32
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "This object counts the number of TestStatusAck messages
         that have been sent on this control channel."
    ::= { lmpControlChannelPerfEntry 35 }

lmpCcLinkSummaryReceived OBJECT-TYPE
    SYNTAX      Counter32
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "This object counts the number of LinkSummary messages
         that have been received on this control channel."
    ::= { lmpControlChannelPerfEntry 36 }

lmpCcLinkSummarySent OBJECT-TYPE
    SYNTAX      Counter32
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "This object counts the number of LinkSummary messages
         that have been sent on this control channel."
    ::= { lmpControlChannelPerfEntry 37 }

lmpCcLinkSummaryRetransmit OBJECT-TYPE
    SYNTAX      Counter32
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "This object counts the number of LinkSummary messages that
         have been retransmitted over this control channel."
    ::= { lmpControlChannelPerfEntry 38 }

lmpCcLinkSummaryAckReceived OBJECT-TYPE
```

```
SYNTAX          Counter32
MAX-ACCESS      read-only
STATUS          current
DESCRIPTION
    "This object counts the number of LinkSummaryAck messages
     that have been received on this control channel."
 ::= { lmpControlChannelPerfEntry 39 }

lmpCcLinkSummaryAckSent OBJECT-TYPE
SYNTAX          Counter32
MAX-ACCESS      read-only
STATUS          current
DESCRIPTION
    "This object counts the number of LinkSummaryAck messages
     that have been sent on this control channel."
 ::= { lmpControlChannelPerfEntry 40 }

lmpCcLinkSummaryNackReceived OBJECT-TYPE
SYNTAX          Counter32
MAX-ACCESS      read-only
STATUS          current
DESCRIPTION
    "This object counts the number of LinkSummaryNack messages
     that have been received on this control channel."
 ::= { lmpControlChannelPerfEntry 41 }

lmpCcLinkSummaryNackSent OBJECT-TYPE
SYNTAX          Counter32
MAX-ACCESS      read-only
STATUS          current
DESCRIPTION
    "This object counts the number of LinkSummaryNack messages
     that have been sent on this control channel."
 ::= { lmpControlChannelPerfEntry 42 }

lmpCcChannelStatusReceived OBJECT-TYPE
SYNTAX          Counter32
MAX-ACCESS      read-only
STATUS          current
DESCRIPTION
    "This object counts the number of ChannelStatus messages
     that have been received on this control channel."
 ::= { lmpControlChannelPerfEntry 43 }

lmpCcChannelStatusSent OBJECT-TYPE
SYNTAX          Counter32
MAX-ACCESS      read-only
STATUS          current
```

DESCRIPTION

"This object counts the number of ChannelStatus messages that have been sent on this control channel."
 ::= { lmpControlChannelPerfEntry 44 }

lmpCcChannelStatusRetransmit OBJECT-TYPE

SYNTAX Counter32
MAX-ACCESS read-only
STATUS current

DESCRIPTION

"This object counts the number of ChannelStatus messages that have been retransmitted on this control channel."
 ::= { lmpControlChannelPerfEntry 45 }

lmpCcChannelStatusAckReceived OBJECT-TYPE

SYNTAX Counter32
MAX-ACCESS read-only
STATUS current

DESCRIPTION

"This object counts the number of ChannelStatusAck messages that have been received on this control channel."
 ::= { lmpControlChannelPerfEntry 46 }

lmpCcChannelStatusAckSent OBJECT-TYPE

SYNTAX Counter32
MAX-ACCESS read-only
STATUS current

DESCRIPTION

"This object counts the number of ChannelStatus messages that have been sent on this control channel."
 ::= { lmpControlChannelPerfEntry 47 }

lmpCcChannelStatusReqReceived OBJECT-TYPE

SYNTAX Counter32
MAX-ACCESS read-only
STATUS current

DESCRIPTION

"This object counts the number of ChannelStatusRequest messages that have been received on this control channel."
 ::= { lmpControlChannelPerfEntry 48 }

lmpCcChannelStatusReqSent OBJECT-TYPE

SYNTAX Counter32
MAX-ACCESS read-only
STATUS current

DESCRIPTION

"This object counts the number of ChannelStatusRequest messages that have been sent on this control channel."

```
 ::= { lmpControlChannelPerfEntry 49 }

lmpCcChannelStatusReqRetransmit OBJECT-TYPE
    SYNTAX      Counter32
    MAX-ACCESS   read-only
    STATUS       current
    DESCRIPTION
        "This object counts the number of ChannelStatusRequest messages
         that have been retransmitted on this control channel."
    ::= { lmpControlChannelPerfEntry 50 }

lmpCcChannelStatusRspReceived OBJECT-TYPE
    SYNTAX      Counter32
    MAX-ACCESS   read-only
    STATUS       current
    DESCRIPTION
        "This object counts the number of ChannelStatusResponse messages
         that have been received on this control channel."
    ::= { lmpControlChannelPerfEntry 51 }

lmpCcChannelStatusRspSent OBJECT-TYPE
    SYNTAX      Counter32
    MAX-ACCESS   read-only
    STATUS       current
    DESCRIPTION
        "This object counts the number of ChannelStatusResponse messages
         that have been sent on this control channel."
    ::= { lmpControlChannelPerfEntry 52 }

lmpCcCounterDiscontinuityTime OBJECT-TYPE
    SYNTAX      TimeStamp
    MAX-ACCESS   read-only
    STATUS       current
    DESCRIPTION
        "The value of sysUpTime on the most recent occasion at which
         one or more of this control channel's counters suffered a
         discontinuity. The relevant counters are the specific
         instances associated with this control channel of any
         Counter32 object contained in the lmpControlChannelPerfTable.
         If no such discontinuities have occurred since the last re-
         initialization of the local management subsystem, then this
         object contains a zero value."
    ::= { lmpControlChannelPerfEntry 53 }

-- End of lmpControlChannelPerfTable

-- LMP TE Link Table
```

```

lmpTeLinkTable OBJECT-TYPE
    SYNTAX          SEQUENCE OF LmpTeLinkEntry
    MAX-ACCESS      not-accessible
    STATUS          current
    DESCRIPTION
        "This table specifies the LMP-specific TE link information.
        Overall TE link information is kept in three separate tables:
        ifTable for interface-specific information, lmpTeLinkTable
        for LMP specific information, and teLinkTable for generic
        TE link information.  ifIndex is the common index to all
        tables."
    ::= { lmpObjects 12 }

lmpTeLinkEntry OBJECT-TYPE
    SYNTAX          LmpTeLinkEntry
    MAX-ACCESS      not-accessible
    STATUS          current
    DESCRIPTION
        "An entry in this table exists for each ifEntry with an
        ifType of teLink(200) that is managed by LMP.  An ifEntry with
        an ifIndex must exist before the corresponding lmpTeLinkEntry is
        created.  If a TE link entry in the ifTable is destroyed, then
        so is the corresponding entry in the lmpTeLinkTable.  The
        administrative status value is controlled from the ifEntry.
        Setting the administrative status to testing prompts LMP to
        start link verification on the TE link.  Information about the
        TE link that is not LMP specific is contained in the
        teLinkTable of the TE-LINK-STD-MIB MIB module."
    INDEX          { ifIndex }
    ::= { lmpTeLinkTable 1 }

LmpTeLinkEntry ::= SEQUENCE {
    lmpTeLinkNbrRemoteNodeId  LmpNodeId,
    lmpTeLinkVerification     TruthValue,
    lmpTeLinkFaultManagement  TruthValue,
    lmpTeLinkDwdm             TruthValue,
    lmpTeLinkOperStatus       INTEGER,
    lmpTeLinkRowStatus        RowStatus,
    lmpTeLinkStorageType      StorageType
}

lmpTeLinkNbrRemoteNodeId OBJECT-TYPE
    SYNTAX          LmpNodeId
    MAX-ACCESS      read-create
    STATUS          current
    DESCRIPTION
        "This is the Node ID of the TE link remote node.  This value
        may be learned during the control channel parameter negotiation

```

```
        phase (in the Config message).  Node ID is an address whose
        type must be IPv4."
 ::= { lmpTeLinkEntry 1 }

lmpTeLinkVerification OBJECT-TYPE
    SYNTAX      TruthValue
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "This object indicates whether the LMP link verification
        procedure is enabled for this TE link."
    REFERENCE
        "Link Management Protocol, RFC 4204."
 ::= { lmpTeLinkEntry 2 }

lmpTeLinkFaultManagement OBJECT-TYPE
    SYNTAX      TruthValue
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "This object indicates whether the LMP fault management procedure
        is enabled on this TE link."
    REFERENCE
        "Link Management Protocol, RFC 4204."
 ::= { lmpTeLinkEntry 3 }

lmpTeLinkDwdm OBJECT-TYPE
    SYNTAX      TruthValue
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "This object indicates whether the LMP DWDM procedure is enabled
        on this TE link."
    REFERENCE
        "Link Management Protocol (LMP) for Dense Wavelength Division
        Multiplexing (DWDM) Optical Line Systems, RFC 4209."
 ::= { lmpTeLinkEntry 4 }

lmpTeLinkOperStatus OBJECT-TYPE
    SYNTAX      INTEGER {
                up(1), down(2), testing(3), init(4), degraded(5)
                }
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The actual operational status of this TE link.  The status
        is set to testing when the TE link is performing link
        verification.  A degraded state indicates that there is
```

```
        no active control channel between the pair of nodes that
        form the endpoints of the TE link, but that at least one
        data-bearing link on the TE link is allocated."
 ::= { lmpTeLinkEntry 5 }

lmpTeLinkRowStatus OBJECT-TYPE
    SYNTAX      RowStatus
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "This variable is used to create, modify, and/or
        delete a row in this table.  None of the writable objects
        in a row can be changed if the status is active(1).
        All read-create objects must have valid and consistent
        values before the row can be activated."
 ::= { lmpTeLinkEntry 6 }

lmpTeLinkStorageType OBJECT-TYPE
    SYNTAX      StorageType
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "The storage type for this conceptual row in the
        lmpTeLinkTable.  Conceptual rows having the value
        'permanent' need not allow write-access to any
        columnar object in the row."
    DEFVAL     { nonVolatile }
 ::= { lmpTeLinkEntry 7 }

-- End of lmpTeLinkTable

lmpGlobalLinkVerificationInterval OBJECT-TYPE
    SYNTAX      Unsigned32
    UNITS       "milliseconds"
    MAX-ACCESS  read-write
    STATUS      current
    DESCRIPTION
        "This object indicates how often the link verification
        procedure is executed.  The interval is in milliseconds.
        A value of 0 is used to indicate that the link
        verification procedure should not be executed.  The
        interval specified in this object should be large enough
        to allow the verification procedure to be completed
        before the start of the next interval.
        Implementations should save the value of this object in
        persistent memory so that it survives restarts or reboot."
 ::= { lmpObjects 13 }
```

-- LMP Link Verification Table

lmpLinkVerificationTable OBJECT-TYPE

SYNTAX SEQUENCE OF LmpLinkVerificationEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"This table specifies TE link information associated with the LMP verification procedure."

::= { lmpObjects 14 }

lmpLinkVerificationEntry OBJECT-TYPE

SYNTAX LmpLinkVerificationEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"An entry in this table is created by an LMP-enabled device for every TE link that supports the LMP verification procedure."

INDEX { ifIndex }

::= { lmpLinkVerificationTable 1 }

LmpLinkVerificationEntry ::= SEQUENCE {

lmpLinkVerifyInterval LmpInterval,

lmpLinkVerifyDeadInterval LmpInterval,

lmpLinkVerifyTransportMechanism BITS,

lmpLinkVerifyAllLinks TruthValue,

lmpLinkVerifyTransmissionRate Unsigned32,

lmpLinkVerifyWavelength Unsigned32,

lmpLinkVerifyRowStatus RowStatus,

lmpLinkVerifyStorageType StorageType

}

lmpLinkVerifyInterval OBJECT-TYPE

SYNTAX LmpInterval

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"This object specifies the VerifyInterval parameter used in the LMP link verification process. It indicates the interval at which the Test messages are sent."

REFERENCE

"Link Management Protocol, RFC 4204."

::= { lmpLinkVerificationEntry 1 }

lmpLinkVerifyDeadInterval OBJECT-TYPE

SYNTAX LmpInterval

MAX-ACCESS read-create


```

STATUS          current
DESCRIPTION
    "This object specifies the VerifyDeadInterval parameter used
    in the verification of the physical connectivity of data-
    bearing links.  It specifies the observation period used to
    detect a Test message at the remote node."
REFERENCE
    "Link Management Protocol, RFC 4204."
 ::= { lmpLinkVerificationEntry 2 }

lmpLinkVerifyTransportMechanism OBJECT-TYPE
SYNTAX          BITS {
    -- All encoding types:
    payload(0),
    -- SONET/SDH encoding type:
    dccSectionOverheadBytes(1),
    dccLineOverheadBytes(2),
    j0Trace(3),
    j1Trace(4),
    j2Trace(5)
}
MAX-ACCESS      read-create
STATUS          current
DESCRIPTION
    "This defines the transport mechanism for the Test messages.  The
    scope of this bit mask is restricted to each link encoding
    type.  The local node will set the bits corresponding to the
    various mechanisms it can support for transmitting LMP Test
    messages.  The receiver chooses the appropriate mechanism in the
    BeginVerifyAck message."
REFERENCE
    "Link Management Protocol, RFC 4204
    Synchronous Optical Network (SONET)/Synchronous Digital
    Hierarchy (SDH) Encoding for Link Management Protocol (LMP)
    Test Messages, RFC 4207."
 ::= { lmpLinkVerificationEntry 3 }

lmpLinkVerifyAllLinks OBJECT-TYPE
SYNTAX          TruthValue
MAX-ACCESS      read-create
STATUS          current
DESCRIPTION
    "A value of true(1) for this object indicates that the
    verification process checks all unallocated links; otherwise,
    only the new ports or component links that have been added to
    this TE link are verified."
 ::= { lmpLinkVerificationEntry 4 }

```

lmpLinkVerifyTransmissionRate OBJECT-TYPE

SYNTAX Unsigned32
UNITS "bytes per second"
MAX-ACCESS read-create
STATUS current

DESCRIPTION

"This is the transmission rate of the data link over which the Test messages will be transmitted and is expressed in bytes per second."

REFERENCE

"Link Management Protocol, RFC 4204."

::= { lmpLinkVerificationEntry 5 }

lmpLinkVerifyWavelength OBJECT-TYPE

SYNTAX Unsigned32
UNITS "nanometers"
MAX-ACCESS read-create
STATUS current

DESCRIPTION

"This value corresponds to the wavelength at which the Test messages will be transmitted and is measured in nanometers (nm). If each data-bearing link corresponds to a separate wavelength, then this value should be set to 0."

REFERENCE

"Link Management Protocol, RFC 4204."

::= { lmpLinkVerificationEntry 6 }

lmpLinkVerifyRowStatus OBJECT-TYPE

SYNTAX RowStatus
MAX-ACCESS read-create
STATUS current

DESCRIPTION

"This variable is used to create, modify, and/or delete a row in this table. None of the writable objects in a row can be changed if the status is active(1). All read-create objects must have valid and consistent values before the row can be activated."

::= { lmpLinkVerificationEntry 7 }

lmpLinkVerifyStorageType OBJECT-TYPE

SYNTAX StorageType
MAX-ACCESS read-create
STATUS current

DESCRIPTION

"The storage type for this conceptual row in the lmpLinkVerificationTable. Conceptual rows having the value 'permanent' need not allow write-access to any

```

        columnar object in the row."
DEFVAL      { nonVolatile }
 ::= { lmpLinkVerificationEntry 8 }

-- End of lmpLinkVerificationTable

-- LMP TE Link Performance Table

lmpTeLinkPerfTable OBJECT-TYPE
SYNTAX      SEQUENCE OF LmpTeLinkPerfEntry
MAX-ACCESS  not-accessible
STATUS      current
DESCRIPTION
    "This table specifies LMP TE link performance counters."
 ::= { lmpObjects 15 }

lmpTeLinkPerfEntry OBJECT-TYPE
SYNTAX      LmpTeLinkPerfEntry
MAX-ACCESS  not-accessible
STATUS      current
DESCRIPTION
    "An entry in this table is created by an LMP-enabled device for
     every TE link. lmpTeCounterDiscontinuityTime is used
     to indicate potential discontinuity for all counter objects
     in this table."
INDEX       { ifIndex }
 ::= { lmpTeLinkPerfTable 1 }

LmpTeLinkPerfEntry ::= SEQUENCE {
    lmpTeInOctets          Counter32,
    lmpTeOutOctets        Counter32,
    lmpTeBeginVerifyReceived Counter32,
    lmpTeBeginVerifySent   Counter32,
    lmpTeBeginVerifyRetransmit Counter32,
    lmpTeBeginVerifyAckReceived Counter32,
    lmpTeBeginVerifyAckSent Counter32,
    lmpTeBeginVerifyNackReceived Counter32,
    lmpTeBeginVerifyNackSent Counter32,
    lmpTeEndVerifyReceived Counter32,
    lmpTeEndVerifySent     Counter32,
    lmpTeEndVerifyRetransmit Counter32,
    lmpTeEndVerifyAckReceived Counter32,
    lmpTeEndVerifyAckSent   Counter32,
    lmpTeTestStatusSuccessReceived Counter32,
    lmpTeTestStatusSuccessSent Counter32,
    lmpTeTestStatusSuccessRetransmit Counter32,
    lmpTeTestStatusFailureReceived Counter32,

```

```

lmpTeTestStatusFailureSent      Counter32,
lmpTeTestStatusFailureRetransmit Counter32,
lmpTeTestStatusAckReceived      Counter32,
lmpTeTestStatusAckSent          Counter32,
lmpTeLinkSummaryReceived        Counter32,
lmpTeLinkSummarySent            Counter32,
lmpTeLinkSummaryRetransmit      Counter32,
lmpTeLinkSummaryAckReceived     Counter32,
lmpTeLinkSummaryAckSent        Counter32,
lmpTeLinkSummaryNackReceived    Counter32,
lmpTeLinkSummaryNackSent       Counter32,
lmpTeChannelStatusReceived      Counter32,
lmpTeChannelStatusSent          Counter32,
lmpTeChannelStatusRetransmit    Counter32,
lmpTeChannelStatusAckReceived   Counter32,
lmpTeChannelStatusAckSent       Counter32,
lmpTeChannelStatusReqReceived   Counter32,
lmpTeChannelStatusReqSent       Counter32,
lmpTeChannelStatusReqRetransmit Counter32,
lmpTeChannelStatusRspReceived   Counter32,
lmpTeChannelStatusRspSent       Counter32,
lmpTeCounterDiscontinuityTime   TimeStamp
}

```

```

lmpTeInOctets OBJECT-TYPE
    SYNTAX      Counter32
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The total number of LMP message octets received for
         this TE link."
    ::= { lmpTeLinkPerfEntry 1 }

```

```

lmpTeOutOctets OBJECT-TYPE
    SYNTAX      Counter32
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The total number of LMP message octets transmitted out
         for this TE link."
    ::= { lmpTeLinkPerfEntry 2 }

```

```

lmpTeBeginVerifyReceived OBJECT-TYPE
    SYNTAX      Counter32
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "This object counts the number of BeginVerify messages that have

```

```
        been received for this TE link."
 ::= { lmpTeLinkPerfEntry 3 }

lmpTeBeginVerifySent OBJECT-TYPE
    SYNTAX      Counter32
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "This object counts the number of BeginVerify messages that have
        been sent for this TE link."
 ::= { lmpTeLinkPerfEntry 4 }

lmpTeBeginVerifyRetransmit OBJECT-TYPE
    SYNTAX      Counter32
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "This object counts the number of BeginVerify messages that
        have been retransmitted for this TE link."
 ::= { lmpTeLinkPerfEntry 5 }

lmpTeBeginVerifyAckReceived OBJECT-TYPE
    SYNTAX      Counter32
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "This object counts the number of BeginVerifyAck messages that
        have been received for this TE link."
 ::= { lmpTeLinkPerfEntry 6 }

lmpTeBeginVerifyAckSent OBJECT-TYPE
    SYNTAX      Counter32
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "This object counts the number of BeginVerifyAck messages that
        have been sent for this TE link."
 ::= { lmpTeLinkPerfEntry 7 }

lmpTeBeginVerifyNackReceived OBJECT-TYPE
    SYNTAX      Counter32
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "This object counts the number of BeginVerifyNack messages that
        have been received for this TE link."
 ::= { lmpTeLinkPerfEntry 8 }
```

```
lmpTeBeginVerifyNackSent OBJECT-TYPE
    SYNTAX      Counter32
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "This object counts the number of BeginVerifyNack messages that
         have been sent for this TE link."
    ::= { lmpTeLinkPerfEntry 9 }

lmpTeEndVerifyReceived OBJECT-TYPE
    SYNTAX      Counter32
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "This object counts the number of EndVerify messages that have
         been received for this TE link."
    ::= { lmpTeLinkPerfEntry 10 }

lmpTeEndVerifySent OBJECT-TYPE
    SYNTAX      Counter32
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "This object counts the number of EndVerify messages that have
         been sent for this TE link."
    ::= { lmpTeLinkPerfEntry 11 }

lmpTeEndVerifyRetransmit OBJECT-TYPE
    SYNTAX      Counter32
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "This object counts the number of EndVerify messages that
         have been retransmitted over this control channel."
    ::= { lmpTeLinkPerfEntry 12 }

lmpTeEndVerifyAckReceived OBJECT-TYPE
    SYNTAX      Counter32
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "This object counts the number of EndVerifyAck messages that
         have been received for this TE link."
    ::= { lmpTeLinkPerfEntry 13 }

lmpTeEndVerifyAckSent OBJECT-TYPE
    SYNTAX      Counter32
    MAX-ACCESS  read-only
```

```
STATUS          current
DESCRIPTION
  "This object counts the number of EndVerifyAck messages that
  have been sent for this TE link."
 ::= { lmpTeLinkPerfEntry 14 }

lmpTeTestStatusSuccessReceived OBJECT-TYPE
SYNTAX          Counter32
MAX-ACCESS      read-only
STATUS          current
DESCRIPTION
  "This object counts the number of TestStatusSuccess messages
  that have been received for this TE link."
 ::= { lmpTeLinkPerfEntry 15 }

lmpTeTestStatusSuccessSent OBJECT-TYPE
SYNTAX          Counter32
MAX-ACCESS      read-only
STATUS          current
DESCRIPTION
  "This object counts the number of TestStatusSuccess messages
  that have been sent for this TE link."
 ::= { lmpTeLinkPerfEntry 16 }

lmpTeTestStatusSuccessRetransmit OBJECT-TYPE
SYNTAX          Counter32
MAX-ACCESS      read-only
STATUS          current
DESCRIPTION
  "This object counts the number of TestStatusSuccess messages
  that have been retransmitted for this TE link."
 ::= { lmpTeLinkPerfEntry 17 }

lmpTeTestStatusFailureReceived OBJECT-TYPE
SYNTAX          Counter32
MAX-ACCESS      read-only
STATUS          current
DESCRIPTION
  "This object counts the number of TestStatusFailure messages
  that have been received for this TE link."
 ::= { lmpTeLinkPerfEntry 18 }

lmpTeTestStatusFailureSent OBJECT-TYPE
SYNTAX          Counter32
MAX-ACCESS      read-only
STATUS          current
DESCRIPTION
  "This object counts the number of TestStatusFailure messages
```

```
        that have been sent for this TE link."
 ::= { lmpTeLinkPerfEntry 19 }

lmpTeTestStatusFailureRetransmit OBJECT-TYPE
    SYNTAX      Counter32
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "This object counts the number of TestStatusFailure messages
         that have been retransmitted on this TE link."
 ::= { lmpTeLinkPerfEntry 20 }

lmpTeTestStatusAckReceived OBJECT-TYPE
    SYNTAX      Counter32
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "This object counts the number of TestStatusAck messages that
         have been received for this TE link."
 ::= { lmpTeLinkPerfEntry 21 }

lmpTeTestStatusAckSent OBJECT-TYPE
    SYNTAX      Counter32
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "This object counts the number of TestStatusAck messages that
         have been sent for this TE link."
 ::= { lmpTeLinkPerfEntry 22 }

lmpTeLinkSummaryReceived OBJECT-TYPE
    SYNTAX      Counter32
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "This object counts the number of LinkSummary messages that
         have been received for this TE link."
 ::= { lmpTeLinkPerfEntry 23 }

lmpTeLinkSummarySent OBJECT-TYPE
    SYNTAX      Counter32
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "This object counts the number of LinkSummary messages that
         have been sent for this TE link."
 ::= { lmpTeLinkPerfEntry 24 }
```



```
lmpTeLinkSummaryRetransmit OBJECT-TYPE
    SYNTAX          Counter32
    MAX-ACCESS      read-only
    STATUS          current
    DESCRIPTION
        "This object counts the number of LinkSummary messages that
         have been retransmitted over this control channel."
    ::= { lmpTeLinkPerfEntry 25 }

lmpTeLinkSummaryAckReceived OBJECT-TYPE
    SYNTAX          Counter32
    MAX-ACCESS      read-only
    STATUS          current
    DESCRIPTION
        "This object counts the number of LinkSummaryAck messages that
         have been received for this TE link."
    ::= { lmpTeLinkPerfEntry 26 }

lmpTeLinkSummaryAckSent OBJECT-TYPE
    SYNTAX          Counter32
    MAX-ACCESS      read-only
    STATUS          current
    DESCRIPTION
        "This object counts the number of LinkSummaryAck messages that
         have been sent for this TE link."
    ::= { lmpTeLinkPerfEntry 27 }

lmpTeLinkSummaryNackReceived OBJECT-TYPE
    SYNTAX          Counter32
    MAX-ACCESS      read-only
    STATUS          current
    DESCRIPTION
        "This object counts the number of LinkSummaryNack messages that
         have been received for this TE link."
    ::= { lmpTeLinkPerfEntry 28 }

lmpTeLinkSummaryNackSent OBJECT-TYPE
    SYNTAX          Counter32
    MAX-ACCESS      read-only
    STATUS          current
    DESCRIPTION
        "This object counts the number of LinkSummaryNack messages that
         have been sent for this TE link."
    ::= { lmpTeLinkPerfEntry 29 }

lmpTeChannelStatusReceived OBJECT-TYPE
    SYNTAX          Counter32
    MAX-ACCESS      read-only
```

```
STATUS          current
DESCRIPTION
  "This object counts the number of ChannelStatus messages that
  have been received for this TE link."
 ::= { lmpTeLinkPerfEntry 30 }

lmpTeChannelStatusSent OBJECT-TYPE
SYNTAX          Counter32
MAX-ACCESS      read-only
STATUS          current
DESCRIPTION
  "This object counts the number of ChannelStatus messages that
  have been sent for this TE link."
 ::= { lmpTeLinkPerfEntry 31 }

lmpTeChannelStatusRetransmit OBJECT-TYPE
SYNTAX          Counter32
MAX-ACCESS      read-only
STATUS          current
DESCRIPTION
  "This object counts the number of ChannelStatus messages that
  have been retransmitted for this TE link."
 ::= { lmpTeLinkPerfEntry 32 }

lmpTeChannelStatusAckReceived OBJECT-TYPE
SYNTAX          Counter32
MAX-ACCESS      read-only
STATUS          current
DESCRIPTION
  "This object counts the number of ChannelStatusAck messages
  that have been received for this TE link."
 ::= { lmpTeLinkPerfEntry 33 }

lmpTeChannelStatusAckSent OBJECT-TYPE
SYNTAX          Counter32
MAX-ACCESS      read-only
STATUS          current
DESCRIPTION
  "This object counts the number of ChannelStatus messages
  that have been sent for this TE link."
 ::= { lmpTeLinkPerfEntry 34 }

lmpTeChannelStatusReqReceived OBJECT-TYPE
SYNTAX          Counter32
MAX-ACCESS      read-only
STATUS          current
DESCRIPTION
  "This object counts the number of ChannelStatusRequest messages
```

```
        that have been received for this TE link."
 ::= { lmpTeLinkPerfEntry 35 }

lmpTeChannelStatusReqSent OBJECT-TYPE
    SYNTAX      Counter32
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "This object counts the number of ChannelStatusRequest messages
         that have been sent for this TE link."
 ::= { lmpTeLinkPerfEntry 36 }

lmpTeChannelStatusReqRetransmit OBJECT-TYPE
    SYNTAX      Counter32
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "This object counts the number of ChannelStatusRequest messages
         that have been retransmitted for this TE link."
 ::= { lmpTeLinkPerfEntry 37 }

lmpTeChannelStatusRspReceived OBJECT-TYPE
    SYNTAX      Counter32
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "This object counts the number of ChannelStatusResponse messages
         that have been received for this TE link."
 ::= { lmpTeLinkPerfEntry 38 }

lmpTeChannelStatusRspSent OBJECT-TYPE
    SYNTAX      Counter32
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "This object counts the number of ChannelStatusResponse messages
         that have been sent for this TE link."
 ::= { lmpTeLinkPerfEntry 39 }

lmpTeCounterDiscontinuityTime OBJECT-TYPE
    SYNTAX      TimeStamp
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The value of sysUpTime on the most recent occasion at which
         one or more of this TE link's counters suffered a
         discontinuity.  The relevant counters are the specific
         instances associated with this TE link of any Counter32
```

```

        object contained in the lmpTeLinkPerfTable.  If
        no such discontinuities have occurred since the last re-
        initialization of the local management subsystem, then this
        object contains a zero value."
 ::= { lmpTeLinkPerfEntry 40 }

-- End of lmpTeLinkPerfTable

-- LMP Data Link Table

lmpDataLinkTable OBJECT-TYPE
    SYNTAX          SEQUENCE OF LmpDataLinkEntry
    MAX-ACCESS      not-accessible
    STATUS          current
    DESCRIPTION
        "This table specifies the data-bearing links managed by the
        LMP."
    ::= { lmpObjects 16 }

lmpDataLinkEntry OBJECT-TYPE
    SYNTAX          LmpDataLinkEntry
    MAX-ACCESS      not-accessible
    STATUS          current
    DESCRIPTION
        "An entry in this table exists for each ifEntry that represents
        a data-bearing link.  An ifEntry with an ifIndex must exist
        before the corresponding lmpDataLinkEntry is created.
        If an entry representing the data-bearing link is destroyed in
        the ifTable, then so is the corresponding entry in the
        lmpDataLinkTable.  The administrative status value is
        controlled from the ifEntry.  The index to this table is also
        used to get information in the componentLinkTable
        of the TE-LINK-STD-MIB MIB module."
    INDEX          { ifIndex }
    ::= { lmpDataLinkTable 1 }

LmpDataLinkEntry ::= SEQUENCE {
    lmpDataLinkType          INTEGER,
    lmpDataLinkAddressType  InetAddressType,
    lmpDataLinkIpAddr       InetAddress,
    lmpDataLinkRemoteIpAddr InetAddress,
    lmpDataLinkRemoteIfId   InterfaceIndexOrZero,
    lmpDataLinkEncodingType TeLinkEncodingType,
    lmpDataLinkActiveOperStatus  INTEGER,
    lmpDataLinkPassiveOperStatus INTEGER,
    lmpDataLinkRowStatus     RowStatus,
    lmpDataLinkStorageType   StorageType
}

```

}

```
lmpDataLinkType OBJECT-TYPE
    SYNTAX      INTEGER {
                    port(1),
                    componentLink(2)
                }
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "This attribute specifies whether this data-bearing link is
        a port or a component link.  Component links are multiplex
        capable, whereas ports are not multiplex capable."
    REFERENCE
        "Link Management Protocol, RFC 4204."
    ::= { lmpDataLinkEntry 1 }
```

```
lmpDataLinkAddressType OBJECT-TYPE
    SYNTAX      InetAddressType
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "This attribute specifies the data-bearing link IP address
        type.  If the data-bearing link is unnumbered, the address
        type must be set to unknown(0)."
    ::= { lmpDataLinkEntry 2 }
```

```
lmpDataLinkIpAddr OBJECT-TYPE
    SYNTAX      InetAddress
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "The local Internet address for numbered links.  The type
        of this address is determined by the value of
        lmpDataLinkAddressType object.

        For IPv4 and IPv6 numbered links, this object represents
        the local IP address associated with the data-bearing
        link.  For an unnumbered link, the local address is
        of type unknown, and this object is set to the zero-length
        string; the ifIndex object then identifies the
        unnumbered address."
    ::= { lmpDataLinkEntry 3 }
```

```
lmpDataLinkRemoteIpAddress OBJECT-TYPE
    SYNTAX      InetAddress
    MAX-ACCESS  read-create
    STATUS      current
```

DESCRIPTION

"The remote Internet address for numbered data-bearing links. The type of this address is determined by the lmpDataLinkAddressType object.

For IPv4 and IPv6 numbered links, this object represents the remote IP address associated with the data-bearing link. For an unnumbered link, the remote address is of type unknown, and this object is set to the zero-length string; the lmpDataLinkRemoteIfId object then identifies the unnumbered address.

This information is either configured manually or communicated by the remote node during the link verification procedure."

```
::= { lmpDataLinkEntry 4 }
```

lmpDataLinkRemoteIfId OBJECT-TYPE

```
SYNTAX      InterfaceIndexOrZero
```

```
MAX-ACCESS  read-create
```

```
STATUS      current
```

DESCRIPTION

"Interface identifier of the remote end point. This information is either configured manually or communicated by the remote node during the link verification procedure."

```
::= { lmpDataLinkEntry 5 }
```

lmpDataLinkEncodingType OBJECT-TYPE

```
SYNTAX      TeLinkEncodingType
```

```
MAX-ACCESS  read-create
```

```
STATUS      current
```

DESCRIPTION

"The encoding type of the data-bearing link."

REFERENCE

"Generalized MPLS Signaling Functional Description, RFC 3471."

```
::= { lmpDataLinkEntry 6 }
```

lmpDataLinkActiveOperStatus OBJECT-TYPE

```
SYNTAX      INTEGER {
                upAlloc(1),
                upFree(2),
                down(3),
                testing(4) }
```

```
MAX-ACCESS  read-only
```

```
STATUS      current
```

DESCRIPTION

"The actual operational status of this data-bearing link

```
        (active FSM)."  
REFERENCE  
    "Link Management Protocol, RFC 4204."  
 ::= { lmpDataLinkEntry 7 }  
  
lmpDataLinkPassiveOperStatus OBJECT-TYPE  
SYNTAX      INTEGER {  
    upAlloc(1),  
    upFree(2),  
    down(3),  
    psvTst(4) }  
MAX-ACCESS  read-only  
STATUS      current  
DESCRIPTION  
    "The actual operational status of this data-bearing link  
    (passive FSM)."  
REFERENCE  
    "Link Management Protocol, RFC 4204."  
 ::= { lmpDataLinkEntry 8 }  
  
lmpDataLinkRowStatus OBJECT-TYPE  
SYNTAX      RowStatus  
MAX-ACCESS  read-create  
STATUS      current  
DESCRIPTION  
    "This variable is used to create, modify, and/or  
    delete a row in this table.  None of the writable objects  
    in a row can be changed if the status is active(1).  
    All read-create objects must have valid and consistent  
    values before the row can be activated."  
 ::= { lmpDataLinkEntry 9 }  
  
lmpDataLinkStorageType OBJECT-TYPE  
SYNTAX      StorageType  
MAX-ACCESS  read-create  
STATUS      current  
DESCRIPTION  
    "The storage type for this conceptual row in the  
    lmpDataLinkTable.  Conceptual rows having the value  
    'permanent' need not allow write-access to any  
    columnar object in the row."  
DEFVAL     { nonVolatile }  
 ::= { lmpDataLinkEntry 10 }  
  
-- End of lmpDataLinkTable  
  
-- LMP Data Link Performance Table
```

```
lmpDataLinkPerfTable OBJECT-TYPE
    SYNTAX          SEQUENCE OF LmpDataLinkPerfEntry
    MAX-ACCESS      not-accessible
    STATUS          current
    DESCRIPTION
        "This table specifies the data-bearing links LMP performance
        counters."
    ::= { lmpObjects 17 }

lmpDataLinkPerfEntry OBJECT-TYPE
    SYNTAX          LmpDataLinkPerfEntry
    MAX-ACCESS      not-accessible
    STATUS          current
    DESCRIPTION
        "An entry in this table contains information about
        the LMP performance counters for the data-bearing links.
        lmpDataLinkDiscontinuityTime is used to indicate potential
        discontinuity for all counter objects in this table."
    INDEX           { ifIndex }
    ::= { lmpDataLinkPerfTable 1 }

LmpDataLinkPerfEntry ::= SEQUENCE {
    lmpDataLinkTestReceived      Counter32,
    lmpDataLinkTestSent          Counter32,
    lmpDataLinkActiveTestSuccess Counter32,
    lmpDataLinkActiveTestFailure Counter32,
    lmpDataLinkPassiveTestSuccess Counter32,
    lmpDataLinkPassiveTestFailure Counter32,
    lmpDataLinkDiscontinuityTime TimeStamp
}

lmpDataLinkTestReceived OBJECT-TYPE
    SYNTAX          Counter32
    MAX-ACCESS      read-only
    STATUS          current
    DESCRIPTION
        "This object counts the number of Test messages that have
        been received on this data-bearing link."
    ::= { lmpDataLinkPerfEntry 1 }

lmpDataLinkTestSent OBJECT-TYPE
    SYNTAX          Counter32
    MAX-ACCESS      read-only
    STATUS          current
    DESCRIPTION
        "This object counts the number of Test messages that have
        been sent on this data-bearing link."
    ::= { lmpDataLinkPerfEntry 2 }
```



```
lmpDataLinkActiveTestSuccess OBJECT-TYPE
    SYNTAX          Counter32
    MAX-ACCESS      read-only
    STATUS          current
    DESCRIPTION
        "This object counts the number of data-bearing link tests
         that were successful on the active side of this data-
         bearing link."
    ::= { lmpDataLinkPerfEntry 3 }

lmpDataLinkActiveTestFailure OBJECT-TYPE
    SYNTAX          Counter32
    MAX-ACCESS      read-only
    STATUS          current
    DESCRIPTION
        "This object counts the number of data-bearing link tests
         that failed on the active side of this data-bearing link."
    ::= { lmpDataLinkPerfEntry 4 }

lmpDataLinkPassiveTestSuccess OBJECT-TYPE
    SYNTAX          Counter32
    MAX-ACCESS      read-only
    STATUS          current
    DESCRIPTION
        "This object counts the number of data-bearing link tests
         that were successful on the passive side of this data-
         bearing link."
    ::= { lmpDataLinkPerfEntry 5 }

lmpDataLinkPassiveTestFailure OBJECT-TYPE
    SYNTAX          Counter32
    MAX-ACCESS      read-only
    STATUS          current
    DESCRIPTION
        "This object counts the number of data-bearing link tests
         that failed on the passive side of this data-bearing link."
    ::= { lmpDataLinkPerfEntry 6 }

lmpDataLinkDiscontinuityTime OBJECT-TYPE
    SYNTAX          TimeStamp
    MAX-ACCESS      read-only
    STATUS          current
    DESCRIPTION
        "The value of sysUpTime on the most recent occasion at which
         one or more of this data-bearing link's counters suffered
         a discontinuity.  The relevant counters are the specific
         instances associated with this data-bearing link of any
         Counter32 object contained in the lmpDataLinkPerfTable.  If
```

```
no such discontinuities have occurred since the last re-
initialization of the local management subsystem, then this
object contains a zero value."
 ::= { lmpDataLinkPerfEntry 7 }

-- End of lmpDataLinkPerfTable

-- Notification Configuration

lmpNotificationMaxRate OBJECT-TYPE
    SYNTAX      Unsigned32
    MAX-ACCESS  read-write
    STATUS      current
    DESCRIPTION
        "The LMP notification rate depends on the size of the network,
        the type of links, the network configuration, the
        reliability of the network, etc.

        When this MIB was designed, care was taken to minimize the
        amount of notifications generated for LMP purposes. Wherever
        possible, notifications are state driven, meaning that the
        notifications are sent only when the system changes state.
        The only notifications that are repeated and that could cause a
        problem as far as congestion is concerned are the ones
        associated with data link verification.
        Without any considerations to handling of these
        notifications, a problem may arise if the number of data
        links is high. Since the data link verification notifications
        can happen only once per data link per link verification
        interval, the notification rate should be sustainable if one
        chooses an appropriate link verification interval for a given
        network configuration. For instance, a network of 100 nodes
        with 5 links of 128 wavelengths each and a link verification
        of 1 minute, where no more than 10% of the links failed at any
        given time, would have 1 notification per second sent from
        each node, or 100 notifications per second for the whole
        network. The rest of the notifications are negligible
        compared to this number.

        To alleviate the congestion problem, the
        lmpNotificationMaxRate object can be used to implement a
        throttling mechanism. It is also possible to enable/disable
        certain type of notifications.

        This variable indicates the maximum number of
        notifications issued per minute. If events occur
        more rapidly, the implementation may simply fail to
```

```
    emit these notifications during that period or may
    queue them until an appropriate time.  A value of 0
    means that no throttling is applied and events may be
    notified at the rate at which they occur.
    Implementations should save the value of this object in
    persistent memory so that it survives restarts or reboot."
 ::= { lmpObjects 18 }

lmpLinkPropertyNotificationsEnabled OBJECT-TYPE
    SYNTAX      TruthValue
    MAX-ACCESS  read-write
    STATUS      current
    DESCRIPTION
        "If this object is true(1), then it enables the
        generation of lmpTeLinkPropertyMismatch
        and lmpDataLinkPropertyMismatch notifications;
        otherwise, these notifications are not emitted.
        Implementations should save the value of this object in
        persistent memory so that it survives restarts or reboot."
    DEFVAL      { false }
    ::= { lmpObjects 19 }

lmpUnprotectedNotificationsEnabled OBJECT-TYPE
    SYNTAX      TruthValue
    MAX-ACCESS  read-write
    STATUS      current
    DESCRIPTION
        "If this object is true(1), then it enables the
        generation of lmpUnprotected notifications;
        otherwise, these notifications are not emitted.
        Implementations should save the value of this object in
        persistent memory so that it survives restarts or reboot."
    DEFVAL      { false }
    ::= { lmpObjects 20 }

lmpCcUpDownNotificationsEnabled OBJECT-TYPE
    SYNTAX      TruthValue
    MAX-ACCESS  read-write
    STATUS      current
    DESCRIPTION
        "If this object is true(1), then it enables the generation of
        lmpControlChannelUp and lmpControlChannelDown notifications;
        otherwise, these notifications are not emitted.
        Implementations should save the value of this object in
        persistent memory so that it survives restarts or reboot."
    DEFVAL      { false }
    ::= { lmpObjects 21 }
```

```
lmpTeLinkNotificationsEnabled OBJECT-TYPE
    SYNTAX      TruthValue
    MAX-ACCESS  read-write
    STATUS      current
    DESCRIPTION
        "If this object is true(1), then it enables the
        generation of lmpTeLinkDegraded and lmpTeLinkNotDegraded
        notifications; otherwise, these notifications are not emitted.
        Implementations should save the value of this object in
        persistent memory so that it survives restarts or reboot."
    DEFVAL      { false }
    ::= { lmpObjects 22 }

lmpDataLinkNotificationsEnabled OBJECT-TYPE
    SYNTAX      TruthValue
    MAX-ACCESS  read-write
    STATUS      current
    DESCRIPTION
        "If this object is true(1), then it enables the
        generation of lmpDataLinkVerificationFailure
        notification; otherwise, these notifications are not emitted.
        Implementations should save the value of this object in
        persistent memory so that it survives restarts or reboot."
    DEFVAL      { false }
    ::= { lmpObjects 23 }

-- Notifications

-- Link Property Mismatch Notifications

lmpTeLinkPropertyMismatch NOTIFICATION-TYPE
    OBJECTS      { teLinkRemoteIpAddr,
                  teLinkIncomingIfId }
    STATUS      current
    DESCRIPTION
        "This notification is generated when a TE link property
        mismatch is detected on the node. The received remote TE link
        ID of the misconfigured TE link is represented by either
        teLinkRemoteIpAddr or teLinkIncomingIfId, depending on whether
        the TE link is numbered or unnumbered. This notification
        should not be sent unless lmpLinkPropertyNotificationsEnabled
        is true(1). It is recommended that this notification be
        reported only the first time a mismatch is detected.
        Otherwise, for a given TE link, this notification can occur
        no more than once per verification interval
        (lmpGlobalLinkVerificationInterval)."
```

```
 ::= { lmpNotifications 1 }
```

```
lmpDataLinkPropertyMismatch NOTIFICATION-TYPE
  OBJECTS      { lmpDataLinkType, lmpDataLinkRemoteIfId }
  STATUS       current
  DESCRIPTION
    "This notification is generated when a data-bearing link
    property mismatch is detected on the node. lmpDataLinkType
    is used to identify the local identifiers associated with
    the data link. (The data link interface index can be used
    to determine the TE link interface index, as this
    relationship is captured in the interface stack table.)
    The remote entity interface ID is the remote entity
    interface ID received in the LinkSummary message.
    This notification should not be sent unless
    lmpLinkPropertyNotificationsEnabled is true(1). It is
    recommended that this notification be reported only the
    first time a mismatch is detected. Otherwise, for a given
    data link, this notification can occur no more than once
    per verification interval (lmpGlobalLinkVerificationInterval)."
```

```
 ::= { lmpNotifications 2 }
```

-- Neighbor Notification

```
lmpUnprotected NOTIFICATION-TYPE
  OBJECTS      { lmpCcNbrNodeId }
  STATUS       current
  DESCRIPTION
    "This notification is generated when there is more than one
    control channel between LMP neighbors and the last redundant
    control channel has failed. If the remaining operational
    control channel fails, then there will be no more control
    channels between the pair of nodes and all the TE links
    between the pair of nodes, will go to degraded state. This
    notification should not be sent unless
    lmpUnprotectedNotificationsEnabled is set to true(1)."
```

```
 ::= { lmpNotifications 3 }
```

-- Control Channel Notifications

```
lmpControlChannelUp NOTIFICATION-TYPE
  OBJECTS      { lmpCcAdminStatus, lmpCcOperStatus }
  STATUS       current
  DESCRIPTION
    "This notification is generated when a control
    channel transitions to the up operational state. This
    notification should not be sent unless
    lmpCcUpDownNotificationsEnabled is true(1)."
```

```
 ::= { lmpNotifications 4 }
```

```
lmpControlChannelDown NOTIFICATION-TYPE
  OBJECTS      { lmpCcAdminStatus, lmpCcOperStatus }
  STATUS       current
  DESCRIPTION
    "This notification is generated when a control channel
     transitions out of the up operational state.  This
     notification should not be sent unless
     lmpCcUpDownNotificationsEnabled is true(1)."
```

::= { lmpNotifications 5 }

-- TE Link Notification

```
lmpTeLinkDegraded NOTIFICATION-TYPE
  OBJECTS      { lmpTeLinkOperStatus }
  STATUS       current
  DESCRIPTION
    "This notification is generated when a lmpTeLinkOperStatus
     object for a TE link enters the degraded state.  This
     notification should not be sent unless
     lmpTeLinkNotificationsEnabled is true(1)."
```

::= { lmpNotifications 6 }

```
lmpTeLinkNotDegraded NOTIFICATION-TYPE
  OBJECTS      { lmpTeLinkOperStatus }
  STATUS       current
  DESCRIPTION
    "This notification is generated when a lmpTeLinkOperStatus
     object for a TE link leaves the degraded state.  This
     notification should not be sent unless
     lmpTeLinkNotificationsEnabled is true(1)."
```

::= { lmpNotifications 7 }

-- Data-bearing Link Notification

```
lmpDataLinkVerificationFailure NOTIFICATION-TYPE
  OBJECTS      { lmpDataLinkActiveOperStatus,
                lmpDataLinkPassiveOperStatus }
  STATUS       current
  DESCRIPTION
    "This notification is generated when a data-bearing
     link verification fails.  This notification should not be sent
     unless lmpDataLinkNotificationsEnabled is true(1).  For a given
     data link, this notification can occur no more than once per
     verification interval (lmpGlobalLinkVerificationInterval)."
```

::= { lmpNotifications 8 }

-- End of notifications

-- Module compliance

lmpCompliances

OBJECT IDENTIFIER ::= { lmpConformance 1 }

lmpGroups

OBJECT IDENTIFIER ::= { lmpConformance 2 }

lmpModuleFullCompliance MODULE-COMPLIANCE

STATUS current

DESCRIPTION

"Compliance statement for agents that support the configuration and monitoring of LMP MIB."

MODULE -- this module

MANDATORY-GROUPS { lmpNodeGroup,
lmpControlChannelGroup,
lmpLinkPropertyCorrelationGroup,
lmpPerfGroup,
lmpTeLinkGroup,
lmpDataLinkGroup }

GROUP lmpCcIsNotInterfaceGroup

DESCRIPTION

"This group is mandatory for devices that support control channels that are not interfaces, in addition to lmpControlChannelGroup. The following constraint applies: lmpCcIsIf must at least be read-only, returning false(2)."

GROUP lmpCcIsInterfaceGroup

DESCRIPTION

"This group is mandatory for devices that support control channels that are interfaces, in addition to lmpControlChannelGroup. The following constraint applies: lmpCcIsIf must at least be read-only, returning true(1)."

GROUP lmpLinkVerificationGroup

DESCRIPTION

"This group is mandatory for devices that support the link verification procedure."

GROUP lmpNotificationGroup

DESCRIPTION

"This group is optional."

-- lmpNbrTable

OBJECT lmpNbrRowStatus

```
SYNTAX      RowStatus { active(1), notInService(2) }
WRITE-SYNTAX RowStatus { active(1), notInService(2),
                        createAndGo(4), destroy(6) }

DESCRIPTION
    "Support for notReady(3) and createAndWait(5) is
    not required."

-- lmpControlChannelTable

OBJECT      lmpCcRemoteAddressType
SYNTAX      INTEGER { unknown(0), ipv4(1), ipv6(2) }
DESCRIPTION
    "Only ipv4(1) and ipv6(2) address types need to be
    supported for non-point-to-point configurations."

OBJECT      lmpCcRemoteIpAddr
SYNTAX      InetAddress (SIZE(0|4|16))
DESCRIPTION
    "The size of the IP address depends on the address type."

OBJECT      lmpCcRowStatus
SYNTAX      RowStatus { active(1), notInService(2) }
WRITE-SYNTAX RowStatus { active(1), notInService(2),
                        createAndGo(4), destroy(6) }
DESCRIPTION
    "Support for notReady(3) and createAndWait(5) is
    not required."

OBJECT      lmpCcOperStatus
SYNTAX      INTEGER { up(1), down(2) }
DESCRIPTION
    "A value of configSnd(3), configRcv(4), active(5), or
    goingDown(6) need not be supported."

-- lmpTeLinkTable

OBJECT      lmpTeLinkOperStatus
SYNTAX      INTEGER { up(1), down(2), degraded(5) }
DESCRIPTION
    "The testing(3) and init(4) state need not be supported."

OBJECT      lmpTeLinkRowStatus
SYNTAX      RowStatus { active(1), notInService(2) }
WRITE-SYNTAX RowStatus { active(1), notInService(2),
                        createAndGo(4), destroy(6) }
DESCRIPTION
    "Support for notReady(3) and createAndWait(5) is
    not required."
```



```

-- lmpDataLinkTable

OBJECT      lmpDataLinkActiveOperStatus
SYNTAX      INTEGER { upAlloc(1), upFree(2), down(3) }
DESCRIPTION
    "A value of testing(4) need not be supported."
OBJECT      lmpDataLinkPassiveOperStatus
SYNTAX      INTEGER { upAlloc(1), upFree(2), down(3) }
DESCRIPTION
    "A value of psvTst(4) need not be supported."

OBJECT      lmpDataLinkRowStatus
SYNTAX      RowStatus { active(1), notInService(2) }
WRITE-SYNTAX RowStatus { active(1), notInService(2),
                        createAndGo(4), destroy(6) }
DESCRIPTION
    "Support for notReady(3) and createAndWait(5) is
    not required."

 ::= { lmpCompliances 1 }

lmpModuleReadOnlyCompliance MODULE-COMPLIANCE
STATUS current
DESCRIPTION
    "Compliance statement for agents that support the
    monitoring of the LMP MIB."
MODULE -- this module

-- The mandatory groups have to be implemented
-- by all LMP-enabled devices. However, they may all be supported
-- as read-only objects in the case where manual
-- configuration is not supported.

MANDATORY-GROUPS { lmpNodeGroup,
                  lmpControlChannelGroup,
                  lmpLinkPropertyCorrelationGroup,
                  lmpPerfGroup,
                  lmpTeLinkGroup,
                  lmpDataLinkGroup }

GROUP lmpCcIsNotInterfaceGroup
DESCRIPTION
    "This group is mandatory for devices that support
    control channels that are not interfaces, in addition to
    lmpControlChannelGroup. The following constraint applies:
    lmpCcIsIf must at least be read-only, returning false(2)."
```

```
GROUP lmpCcIsInterfaceGroup
```

DESCRIPTION
"This group is mandatory for devices that support control channels that are interfaces, in addition to lmpControlChannelGroup. The following constraint applies: lmpCcIsIf must at least be read-only, returning true(1)."

GROUP lmpLinkVerificationGroup
DESCRIPTION
"This group is mandatory for devices that support the link verification procedure."

GROUP lmpNotificationGroup
DESCRIPTION
"This group is optional."

-- Scalars

OBJECT lmpAdminStatus
MIN-ACCESS read-only
DESCRIPTION
"Write access is not required."

OBJECT lmpGlobalLinkVerificationInterval
MIN-ACCESS read-only
DESCRIPTION
"Write access is not required."

OBJECT lmpCcHelloIntervalDefault
MIN-ACCESS read-only
DESCRIPTION
"Write access is not required."

OBJECT lmpCcHelloIntervalDefaultMin
MIN-ACCESS read-only
DESCRIPTION
"Write access is not required."

OBJECT lmpCcHelloIntervalDefaultMax
MIN-ACCESS read-only
DESCRIPTION
"Write access is not required."

OBJECT lmpCcHelloDeadIntervalDefault
MIN-ACCESS read-only
DESCRIPTION
"Write access is not required."

OBJECT lmpCcHelloDeadIntervalDefaultMin

```
MIN-ACCESS read-only
DESCRIPTION
    "Write access is not required."

OBJECT      lmpCcHelloDeadIntervalDefaultMax
MIN-ACCESS read-only
DESCRIPTION
    "Write access is not required."

OBJECT      lmpNotificationMaxRate
MIN-ACCESS read-only
DESCRIPTION
    "Write access is not required."

-- lmpNbrTable

OBJECT      lmpNbrRetransmitInterval
MIN-ACCESS read-only
DESCRIPTION
    "Write access is not required."

OBJECT      lmpNbrRetryLimit
MIN-ACCESS read-only
DESCRIPTION
    "Write access is not required."

OBJECT      lmpNbrRetransmitDelta
MIN-ACCESS read-only
DESCRIPTION
    "Write access is not required."

OBJECT      lmpNbrRowStatus
SYNTAX      RowStatus { active(1) }
MIN-ACCESS read-only
DESCRIPTION
    "Write access is not required, and active(1) is the
    only status that needs to be supported."

OBJECT      lmpNbrStorageType
MIN-ACCESS read-only
DESCRIPTION
    "Write access is not required."

-- lmpControlChannelTable

OBJECT      lmpCcUnderlyingIfIndex
MIN-ACCESS read-only
DESCRIPTION
```

"Write access is not required."

OBJECT lmpCcIsIf
MIN-ACCESS read-only
DESCRIPTION

"Write access is not required."

OBJECT lmpCcNbrNodeId
MIN-ACCESS read-only
DESCRIPTION

"Write access is not required."

OBJECT lmpCcRemoteAddressType
SYNTAX INTEGER { unknown(0), ipv4(1), ipv6(2) }
MIN-ACCESS read-only
DESCRIPTION

"Only ipv4(1) and ipv6(2) address types need to be supported for non-point-to-point configurations."

OBJECT lmpCcRemoteIpAddr
SYNTAX InetAddress (SIZE(0|4|16))
MIN-ACCESS read-only
DESCRIPTION

"The size of the IP address depends on the address type."

OBJECT lmpCcSetupRole
MIN-ACCESS read-only
DESCRIPTION

"Write access is not required."

OBJECT lmpCcAuthentication
MIN-ACCESS read-only
DESCRIPTION

"Write access is not required."

OBJECT lmpCcHelloIntervalMin
MIN-ACCESS read-only
DESCRIPTION

"Write access is not required."

OBJECT lmpCcHelloIntervalMax
MIN-ACCESS read-only
DESCRIPTION

"Write access is not required."

OBJECT lmpCcHelloDeadIntervalMin
MIN-ACCESS read-only
DESCRIPTION

"Write access is not required."

OBJECT lmpCcHelloDeadIntervalMax
MIN-ACCESS read-only
DESCRIPTION

"Write access is not required."

OBJECT lmpCcRowStatus
SYNTAX RowStatus { active(1) }
MIN-ACCESS read-only
DESCRIPTION

"Write access is not required, and active(1) is the only status that needs to be supported."

OBJECT lmpCcOperStatus
SYNTAX INTEGER { up(1), down(2) }
DESCRIPTION

"A value of configSnd(3), configRcv(4), active(5), or goingDown(6) need not be supported."

OBJECT lmpCcStorageType
MIN-ACCESS read-only
DESCRIPTION

"Write access is not required."

-- lmpLinkVerificationTable

OBJECT lmpLinkVerifyInterval
MIN-ACCESS read-only
DESCRIPTION

"Write access is not required."

OBJECT lmpLinkVerifyDeadInterval
MIN-ACCESS read-only
DESCRIPTION

"Write access is not required."

OBJECT lmpLinkVerifyAllLinks
MIN-ACCESS read-only
DESCRIPTION

"Write access is not required."

-- lmpTeLinkTable

OBJECT lmpTeLinkNbrRemoteNodeId
MIN-ACCESS read-only
DESCRIPTION

"Write access is not required if the link verification

procedure is enabled."

OBJECT lmpTeLinkVerification
MIN-ACCESS read-only
DESCRIPTION

"Write access is not required."

OBJECT lmpTeLinkFaultManagement
MIN-ACCESS read-only
DESCRIPTION

"Write access is not required."

OBJECT lmpTeLinkDwdm
MIN-ACCESS read-only
DESCRIPTION

"Write access is not required."

OBJECT lmpTeLinkOperStatus
SYNTAX INTEGER { up(1), down(2), degraded(5) }
DESCRIPTION

"The testing(3) and init(4) state need not be supported."

OBJECT lmpTeLinkRowStatus
SYNTAX RowStatus { active(1) }
MIN-ACCESS read-only
DESCRIPTION

"Write access is not required, and active(1) is the
only status that needs to be supported."

OBJECT lmpTeLinkStorageType
MIN-ACCESS read-only
DESCRIPTION

"Write access is not required."

-- lmpTeLinkVerificationTable

OBJECT lmpLinkVerifyTransmissionRate
MIN-ACCESS read-only
DESCRIPTION

"Write access is not required."

OBJECT lmpLinkVerifyWavelength
MIN-ACCESS read-only
DESCRIPTION

"Write access is not required."

OBJECT lmpLinkVerifyRowStatus
SYNTAX RowStatus { active(1) }

```
MIN-ACCESS read-only
DESCRIPTION
    "Write access is not required, and active(1) is the
    only status that needs to be supported."

OBJECT      lmpLinkVerifyStorageType
MIN-ACCESS read-only
DESCRIPTION
    "Write access is not required."

-- lmpDataLinkTable

OBJECT      lmpDataLinkAddressType
SYNTAX      INTEGER { unknown(0), ipv4(1), ipv6(2) }
MIN-ACCESS read-only
DESCRIPTION
    "Only ipv4(1) and ipv6(2) address types need to be
    supported for numbered links. For unnumbered links, the
    unknown(0) address type needs to be supported."

OBJECT      lmpDataLinkIpAddr
SYNTAX      InetAddress (SIZE(0|4|16))
MIN-ACCESS read-only
DESCRIPTION
    "The size of the data-bearing link IP address depends on
    the type of data-bearing link. Data-bearing link IP
    address size is zero if the link is unnumbered, four if
    the link IP address is IPv4, and sixteen if the link IP
    address is IPv6."

OBJECT      lmpDataLinkRemoteIpAddress
SYNTAX      InetAddress (SIZE(0|4|16))
MIN-ACCESS read-only
DESCRIPTION
    "Write access is not required if the link verification
    procedure is enabled."

OBJECT      lmpDataLinkRemoteIfId
MIN-ACCESS read-only
DESCRIPTION
    "Write access is not required if the link verification
    procedure is enabled."

OBJECT      lmpDataLinkEncodingType
MIN-ACCESS read-only
DESCRIPTION
    "Write access is not required."
```

```

OBJECT      lmpDataLinkActiveOperStatus
SYNTAX      INTEGER { upAlloc(1), upFree(2), down(3) }
DESCRIPTION
    "A value of testing(4) need not be supported."

```

```

OBJECT      lmpDataLinkPassiveOperStatus
SYNTAX      INTEGER { upAlloc(1), upFree(2), down(3) }
DESCRIPTION
    "A value of psvTst(4) need not be supported."

```

```

OBJECT      lmpDataLinkRowStatus
SYNTAX      RowStatus { active(1) }
MIN-ACCESS  read-only
DESCRIPTION
    "Write access is not required, and active(1) is the
    only status that needs to be supported."

```

```

OBJECT      lmpDataLinkStorageType
MIN-ACCESS  read-only
DESCRIPTION
    "Write access is not required."

```

```
 ::= { lmpCompliances 2 }
```

```
-- Units of conformance
```

```

lmpNodeGroup OBJECT-GROUP
  OBJECTS { lmpAdminStatus,
            lmpOperStatus,
            lmpNbrAdminStatus,
            lmpNbrOperStatus,
            lmpNbrRowStatus,
            lmpNbrStorageType,
            lmpUnprotectedNotificationsEnabled,
            lmpNotificationMaxRate
          }
  STATUS current
  DESCRIPTION
    "Collection of objects that represent LMP node
    configuration."
  ::= { lmpGroups 1 }

```

```

lmpControlChannelGroup OBJECT-GROUP
  OBJECTS {
    lmpNbrRetransmitInterval,
    lmpNbrRetryLimit,
    lmpNbrRetransmitDelta,
    lmpNbrAdminStatus,

```



```

    lmpNbrOperStatus,
    lmpNbrRowStatus,
    lmpNbrStorageType,
    lmpCcHelloIntervalDefault,
    lmpCcHelloIntervalDefaultMin,
    lmpCcHelloIntervalDefaultMax,
    lmpCcHelloDeadIntervalDefault,
    lmpCcHelloDeadIntervalDefaultMin,
    lmpCcHelloDeadIntervalDefaultMax,
    lmpCcNbrNodeId,
    lmpCcRemoteId,
    lmpCcRemoteAddressType,
    lmpCcRemoteIpAddr,
    lmpCcSetupRole,
    lmpCcAuthentication,
    lmpCcHelloInterval,
    lmpCcHelloIntervalMin,
    lmpCcHelloIntervalMax,
    lmpCcHelloIntervalNegotiated,
    lmpCcHelloDeadInterval,
    lmpCcHelloDeadIntervalMin,
    lmpCcHelloDeadIntervalMax,
    lmpCcHelloDeadIntervalNegotiated,
    lmpCcOperStatus,
    lmpCcRowStatus,
    lmpCcStorageType,
    lmpCcUpDownNotificationsEnabled
  }
  STATUS current
  DESCRIPTION
    "Objects that can be used to configure LMP interface."
  ::= { lmpGroups 2 }

lmpCcIsInterfaceGroup OBJECT-GROUP
  OBJECTS { lmpCcIsIf }
  STATUS current
  DESCRIPTION
    "Objects that can be used to configure control channels
    that are interfaces."
  ::= { lmpGroups 3 }

lmpCcIsNotInterfaceGroup OBJECT-GROUP
  OBJECTS { lmpCcUnderlyingIfIndex,
            lmpCcIsIf,
            lmpCcLastChange,
            lmpCcAdminStatus
          }
  STATUS current

```

```
DESCRIPTION
    "Objects that can be used to configure control channels
    that are not interfaces."
 ::= { lmpGroups 4 }

lmpLinkPropertyCorrelationGroup OBJECT-GROUP
OBJECTS { lmpLinkPropertyNotificationsEnabled }
STATUS current
DESCRIPTION
    "Collection of objects used to configure the link
    property correlation procedure."
 ::= { lmpGroups 5 }

lmpLinkVerificationGroup OBJECT-GROUP
OBJECTS { lmpGlobalLinkVerificationInterval,
          lmpLinkVerifyInterval,
          lmpLinkVerifyDeadInterval,
          lmpLinkVerifyTransportMechanism,
          lmpLinkVerifyAllLinks,
          lmpLinkVerifyTransmissionRate,
          lmpLinkVerifyWavelength,
          lmpLinkVerifyRowStatus,
          lmpLinkVerifyStorageType,
          lmpDataLinkNotificationsEnabled
        }
STATUS current
DESCRIPTION
    "Collection of objects that represent the link
    verification procedure configuration."
 ::= { lmpGroups 6 }

lmpPerfGroup OBJECT-GROUP
OBJECTS { lmpCcInOctets,
          lmpCcInDiscards,
          lmpCcInErrors,
          lmpCcOutOctets,
          lmpCcOutDiscards,
          lmpCcOutErrors,
          lmpCcConfigReceived,
          lmpCcConfigSent,
          lmpCcConfigRetransmit,
          lmpCcConfigAckReceived,
          lmpCcConfigAckSent,
          lmpCcConfigNackSent,
          lmpCcConfigNackReceived,
          lmpCcHelloReceived,
          lmpCcHelloSent,
          lmpCcBeginVerifyReceived,
```

```
lmpCcBeginVerifySent ,
lmpCcBeginVerifyRetransmit ,
lmpCcBeginVerifyAckReceived ,
lmpCcBeginVerifyAckSent ,
lmpCcBeginVerifyNackReceived ,
lmpCcBeginVerifyNackSent ,
lmpCcEndVerifyReceived ,
lmpCcEndVerifySent ,
lmpCcEndVerifyRetransmit ,
lmpCcEndVerifyAckReceived ,
lmpCcEndVerifyAckSent ,
lmpCcTestStatusSuccessReceived ,
lmpCcTestStatusSuccessSent ,
lmpCcTestStatusSuccessRetransmit ,
lmpCcTestStatusFailureReceived ,
lmpCcTestStatusFailureSent ,
lmpCcTestStatusFailureRetransmit ,
lmpCcTestStatusAckReceived ,
lmpCcTestStatusAckSent ,
lmpCcLinkSummaryReceived ,
lmpCcLinkSummarySent ,
lmpCcLinkSummaryRetransmit ,
lmpCcLinkSummaryAckReceived ,
lmpCcLinkSummaryAckSent ,
lmpCcLinkSummaryNackReceived ,
lmpCcLinkSummaryNackSent ,
lmpCcChannelStatusReceived ,
lmpCcChannelStatusSent ,
lmpCcChannelStatusRetransmit ,
lmpCcChannelStatusAckReceived ,
lmpCcChannelStatusAckSent ,
lmpCcChannelStatusReqReceived ,
lmpCcChannelStatusReqSent ,
lmpCcChannelStatusReqRetransmit ,
lmpCcChannelStatusRspReceived ,
lmpCcChannelStatusRspSent ,
lmpCcCounterDiscontinuityTime ,
lmpTeInOctets ,
lmpTeOutOctets ,
lmpTeBeginVerifyReceived ,
lmpTeBeginVerifySent ,
lmpTeBeginVerifyRetransmit ,
lmpTeBeginVerifyAckReceived ,
lmpTeBeginVerifyAckSent ,
lmpTeBeginVerifyNackReceived ,
lmpTeBeginVerifyNackSent ,
lmpTeEndVerifyReceived ,
lmpTeEndVerifySent ,
```

```

    lmpTeEndVerifyRetransmit,
    lmpTeEndVerifyAckReceived,
    lmpTeEndVerifyAckSent,
    lmpTeTestStatusSuccessReceived,
    lmpTeTestStatusSuccessSent,
    lmpTeTestStatusSuccessRetransmit,
    lmpTeTestStatusFailureReceived,
    lmpTeTestStatusFailureSent,
    lmpTeTestStatusFailureRetransmit,
    lmpTeTestStatusAckReceived,
    lmpTeTestStatusAckSent,
    lmpTeLinkSummaryReceived,
    lmpTeLinkSummarySent,
    lmpTeLinkSummaryRetransmit,
    lmpTeLinkSummaryAckReceived,
    lmpTeLinkSummaryAckSent,
    lmpTeLinkSummaryNackReceived,
    lmpTeLinkSummaryNackSent,
    lmpTeChannelStatusReceived,
    lmpTeChannelStatusSent,
    lmpTeChannelStatusRetransmit,
    lmpTeChannelStatusAckReceived,
    lmpTeChannelStatusAckSent,
    lmpTeChannelStatusReqReceived,
    lmpTeChannelStatusReqSent,
    lmpTeChannelStatusReqRetransmit,
    lmpTeChannelStatusRspSent,
    lmpTeChannelStatusRspReceived,
    lmpTeCounterDiscontinuityTime,
    lmpDataLinkTestReceived,
    lmpDataLinkTestSent,
    lmpDataLinkActiveTestSuccess,
    lmpDataLinkActiveTestFailure,
    lmpDataLinkPassiveTestSuccess,
    lmpDataLinkPassiveTestFailure,
    lmpDataLinkDiscontinuityTime
  }
STATUS current
DESCRIPTION
    "Collection of objects used to provide performance
    information about LMP interfaces and data-bearing links."
 ::= { lmpGroups 7 }

lmpTeLinkGroup OBJECT-GROUP
    OBJECTS { lmpTeLinkNbrRemoteNodeId,
              lmpTeLinkVerification,
              lmpTeLinkFaultManagement,
              lmpTeLinkDwdm,

```

```
        lmpTeLinkOperStatus,
        lmpTeLinkRowStatus,
        lmpTeLinkStorageType,
        lmpTeLinkNotificationsEnabled
    }
STATUS    current
DESCRIPTION
    "Objects that can be used to configure TE links."
 ::= { lmpGroups 8 }

lmpDataLinkGroup OBJECT-GROUP
OBJECTS { lmpDataLinkType,
          lmpDataLinkAddressType,
          lmpDataLinkIpAddress,
          lmpDataLinkRemoteIpAddress,
          lmpDataLinkRemoteIfId,
          lmpDataLinkEncodingType,
          lmpDataLinkActiveOperStatus,
          lmpDataLinkPassiveOperStatus,
          lmpDataLinkRowStatus,
          lmpDataLinkStorageType
        }
STATUS    current
DESCRIPTION
    "Collection of objects that represent data-bearing link
     configuration."
 ::= { lmpGroups 9 }

lmpNotificationGroup NOTIFICATION-GROUP
NOTIFICATIONS { lmpTeLinkPropertyMismatch,
               lmpDataLinkPropertyMismatch,
               lmpUnprotected,
               lmpControlChannelUp,
               lmpControlChannelDown,
               lmpTeLinkDegraded,
               lmpTeLinkNotDegraded,
               lmpDataLinkVerificationFailure }
STATUS    current
DESCRIPTION
    "Set of notifications defined in this module."
 ::= { lmpGroups 10 }

-- End of LMP-MIB
END
```

10. Security Considerations

There are a number of management objects defined in this MIB module with a MAX-ACCESS clause of read-write and/or read-create. Such objects may be considered sensitive or vulnerable in some network environments. The support for SET operations in a non-secure environment without proper protection can have a negative effect on network operations. These are the tables and objects and their sensitivity/vulnerability:

- Unauthorized changes to the `lmpNbrTable`, `lmpControlChannelTable`, `lmpTeLinkTable`, and `lmpDataLinkTable` may disrupt allocation of resources in the network.

Some of the readable objects in this MIB module (i.e., objects with a MAX-ACCESS other than not-accessible) may be considered sensitive or vulnerable in some network environments. It is thus important to control even GET and/or NOTIFY access to these objects and possibly to even encrypt the values of these objects when sending them over the network via SNMP. These are the tables and objects and their sensitivity/vulnerability:

- The `lmpNbrTable` exposes the network provider's node IP addresses.
- `lmpControlChannelTable` exposes the network provider's control network.
- `lmpDataLinkTable` exposes the network provider's data network.

SNMP versions prior to SNMPv3 did not include adequate security. Even if the network itself is secure (for example by using IPsec), even then, there is no control as to who on the secure network is allowed to access and GET/SET (read/change/create/delete) the objects in this MIB module.

It is RECOMMENDED that implementers consider the security features as provided by the SNMPv3 framework (see [RFC3410], section 8), including full support for the SNMPv3 cryptographic mechanisms (for authentication and privacy).

Further, deployment of SNMP versions prior to SNMPv3 is NOT RECOMMENDED. Instead, it is RECOMMENDED to deploy SNMPv3 and to enable cryptographic security. It is then a customer/operator responsibility to ensure that the SNMP entity giving access to an instance of this MIB module is properly configured to give access to the objects only to those principals (users) that have legitimate rights to indeed GET or SET (change/create/delete) them.

11. Contributors

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12. Acknowledgements

The general structure of this document has been modeled around the MPLS Label Switching Router (LSR) MIB [RFC3813].

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13. IANA Considerations

No new IANA actions are requested in this document. All IANA actions from RFC 4327 still hold and are reproduced here for information.

Note that new assignments can only be made via a Standards Action as specified in [RFC2434].

13.1. IANA Considerations for LMP ifType

The IANA has assigned 227 ifType for LMP interfaces.

13.2. IANA Considerations for LMP-MIB

The IANA has assigned { transmission 227 } to the LMP-MIB module specified in this document.

14. Changes from RFC 4327 to RFC 4631

The following changes have been made relative to RFC 4327.

- a. Show that this document obsoletes RFC 4327.
- b. Indicate in Abstract that this document provides minor corrections to RFC 4327.
- c. Correct use of TruthValue settings such that True is always 1, and False is always 2.
- d. Update to acknowledgements section.
- e. Note in IANA section to show no further action required.
- f. Remove identification of RFC 4327 and request RFC Editor to insert new RFC number.
- g. Update timestamps.

- h. Update author information.
- i. Added punctuation to REFERENCE clauses.
- j. Update Revision History clause.
- k. Add this section.
- l. Remove square braces from references to external documents from within the MIB module itself.
- m. Minor editorial corrections to text and DESCRIPTIONS clauses.

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