Traffic Engineering Link Management Information Base

Status of This Memo

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Abstract

This memo defines a portion of the Management Information Base (MIB) for use with network management protocols in the Internet community. In particular, it describes managed objects for modeling TE links as described in the Link Bundling in MPLS Traffic Engineering (TE) document.
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

OSPF [RFC3630], Generalized MPLS (GMPLS) [RFC3471], and the Link Management Protocol (LMP) [RFC4204] use the concept of traffic engineering (TE) links to abstract link properties. The effect of this approach is a reduction in the amount of routing information exchanged in the network, which improves routing scalability. In addition, the use of TE links allows the implementation of new capabilities such as link protection.

In this document, we present a MIB module that can be used to manage TE links and their extension, the bundled link. This MIB module enables both the configuration and the performance monitoring of TE links and the bundled link.

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 documents describing link bundling [RFC4201] and GMPLS [RFC3945].

The link bundling feature is designed to aggregate one or more similar entities between a node pair into a bundled link [RFC4201]. In RFC 4201, those entities are referred to as TE links. A TE link is a subinterface capable of carrying MPLS traffic engineered traffic. A TE Link may be comprised of only one underlying component link. In cases where more than one component links are to be combined, multiple component links should be created with differing priorities to indicate hot-standby or parallel utilization.

A bundled link is another kind of Traffic Engineering (TE) link (see RFC4203). A link bundle is a subinterface that binds the traffic of a group of one or more TE links. There should be more than one TE Link in a link bundle, but this is not a requirement. Furthermore, if there are more than one TE links in a link bundle at some time, and at some point later, all but one of the links are deleted, the agent may choose to either delete the link bundle, or it may choose to leave it intact. Traffic counters on a link bundle are cumulative for all subinterfaces that it binds together.
4. Feature Checklist

The TE Link MIB module (TE-LINK-STD-MIB) is designed to satisfy the following requirements and constraints:

- The MIB module supports the management of TE links, including bundled links.
- Support is provided for configuration of traffic engineering parameters associated with TE links.
- The MIB module is used to monitor the priority-based component link and TE link bandwidth values.

5. Outline

Configuring bundled links involves the following steps:

- Creating a bundled link.
- Creating TE links.
- Optionally specifying the shared risk link groups associated with the TE links.
- Configuring the component links including the bandwidth parameters and associating the component links with the appropriate TE link.
- Associating the TE links with the appropriate bundled link.

6. Brief Description of MIB Objects

Sections 6.1 - 6.4 describe objects pertaining to TE links while Sections 6.5 - 6.7 describe objects pertaining to component links. The MIB objects were derived from the link bundling document [RFC4201].

6.1. teLinkTable

This table represents the TE links, including bundled links, and their generic traffic engineering parameters.

6.2. teLinkDescriptorTable

This table represents the TE link interface switching capability descriptors.
6.3.  teLinkSrlgTable

This table represents the shared risk link groups (SRLGs) associated with TE links.

6.4.  teLinkBandwidthTable

This table specifies the priority-based bandwidth traffic engineering parameters associated with TE links.

6.5.  componentLinkTable

This table enumerates the component links and their generic traffic engineering parameters.

6.6.  componentLinkDescriptorTable

This table enumerates the interface switching capability descriptors that each component link supports.

6.7.  componentLinkBandwidthTable

The component link bandwidth table specifies the priority-based bandwidth values associated with the component links.

Component links that belong to the same TE link must be compatible. If these two tables are managed independently, mechanisms should be put in place to ensure consistency between the two tables. TE links that form a bundled link must have compatible traffic engineering parameters (resource class, link metric, and protection type).

The link descriptors of the teLinkDescriptorTable can be derived from the link descriptors of the componentLinkDescrTable.

Some of the bandwidth parameters of the teLinkTable, teLinkDescriptorTable, teLinkBandwidthTable are derived from the bandwidth parameters of the componentLinkTable, componentLinkDescriptorTable, and componentLinkBandwidthTable (maximum reservable bandwidth, minimum LSP bandwidth, maximum LSP bandwidth at specified priority, and unreserved bandwidth).

7.  Example of Bundled Link Setup

In this section, we provide a brief example of using the MIB objects described in section 10 to set up a bundled link. While this example is not meant to illustrate every nuance of the MIB module, it is intended as an aid to understanding some of the key concepts. It is meant to be read after going through the MIB module itself. Section
8.2 provides more details on the use of the ifStackTable to establish relationships between bundled links, TE links, and component links.

Suppose that one would like to manually create a bundled link out of two 1:1 TE links, as depicted in the figure in Section 8.2. Assume that the bundled link is associated with SRLGs 10 and 50. Finally, let the component links be port entity interfaces (lambdas). The following example illustrates which rows and corresponding objects might be created to accomplish this.

First, a bundled link entry is created. An ifEntry with the same ifIndex and with ifType teLink needs to be created beforehand.

In teLinkTable:
{
    ifIndex = 2,
    teLinkAddressType = unknown(0),
    teLinkLocalIpAddr = "H",
    teLinkRemoteIpAddr = "H",
    teLinkMetric = 5,
    teLinkProtectionType = dedicated1For1(4),
    teLinkWorkingPriority = 7,
    teLinkResourceClass = 3,
    teLinkIncomingIfId = 0,
    teLinkOutgoingIfId = 2,
    teLinkRowStatus = createAndGo(4),
    teLinkStorageType = nonVolatile(3)
}

In ifStackTable:
{
    ifStackHigherLayer = 0,
    ifStackLowerLayer = 2,
    ifStackStatus = createAndGo(4)
}

Next, the two TE links are created.

In teLinkTable:
{
    ifIndex = 3,
    teLinkAddressType = unknown(0),
    teLinkLocalIpAddr = "H",
    teLinkRemoteIpAddr = "H",
    teLinkMetric = 5,
    teLinkProtectionType = unprotected(2),
    teLinkWorkingPriority = 7,
    teLinkResourceClass = 3,
In ifStackTable:
{
  ifStackHigherLayer = 2,
  ifStackLowerLayer = 3,
  ifStackStatus = createAndGo(4)
}

In teLinkTable:
{
  ifIndex = 4,
  teLinkAddressType = unknown(0),
  teLinkLocalIpAddr = "H",
  teLinkRemoteIpAddr = "H",
  teLinkMetric = 5,
  teLinkProtectionType = unprotected(2),
  teLinkWorkingPriority = 7,
  teLinkResourceClass = 3,
  teLinkIncomingIfId = 0,
  teLinkOutgoingIfId = 4,
  teLinkRowStatus = createAndGo(4),
  teLinkStorageType = nonVolatile(3)
}

In ifStackTable:
{
  ifStackHigherLayer = 2,
  ifStackLowerLayer = 4,
  ifStackStatus = createAndGo(4)
}

We assign SRLGs to the TE links.

In the teLinkSrlgTable:
{
  ifIndex = 3,
  teLinkSrlg = 10,
  teLinkSrlgRowStatus = createAndGo(4),
  teLinkSrlgStorageType = nonVolatile(3)
}
The bundled link inherits the SRLG properties from the associated TE links.

Next, for each unbundled TE link, a component link is created. An ifEntry with the same ifIndex needs to be created beforehand.

In componentLinkTable:
{
  ifIndex = 5,
  componentLinkPreferredProtection = primary(1),
  componentLinkRowStatus = createAndGo(4),
  componentLinkStorageType = nonVolatile(3)
}

In ifStackTable:
{
  ifStackHigherLayer = 3,
  ifStackLowerLayer = 5,
  ifStackStatus = createAndGo(4)
}

In componentLinkTable:
{
  ifIndex = 6,
  componentLinkPreferredProtection = secondary(2),
  componentLinkRowStatus = createAndGo(4),
  componentLinkStorageType = nonVolatile(3)
}

In ifStackTable:
{
  ifStackHigherLayer = 4,
  ifStackLowerLayer = 6,
  ifStackStatus = createAndGo(4)
}

In this example, once a component link is added to the componentLinkTable, the associated link descriptors are implicitly added to the componentLinkDescriptorTable.

TE link link descriptors are derived from their component link descriptors.
Note that the bandwidth attributes in teLinkDescriptorTable, componentLinkDescriptorTable, teLinkBandwidthTable, and componentLinkBandwidthTable are maintained by the device according to LSP creation/deletion at different priorities. The values in the teLinkBandwidthTable are an aggregation of the values for the component links of the TE links and the TE links of the bundled link.

8. Application of the Interfaces Group to TE Links

The Interfaces Group [RFC2863] defines generic managed objects for managing interfaces. This memo contains the media-specific extensions to the Interfaces Group for managing TE Link interfaces as logical interfaces.

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. Thus, the TE Link interface is represented as an entry in the ifTable. The interrelation of entries in the ifTable is defined by Interfaces Stack Group, as defined in [RFC2863].

When using TE Link interfaces, the interface stack table might appear as follows:

+----------------------------------------+
| TE link-interface ifType = teLink(200) +
| +----------------------------------------+
| Underlying Layer... +
+----------------------------------------+

In the above diagram, "Underlying Layer..." refers to the ifIndex of any interface type, which has been defined for TE Link interworking. Examples include ATM, Frame Relay, Ethernet, etc.

8.1. Support of the TE Link Layer by ifTable

Some specific interpretations of ifTable for the TE Link layer follow.

<table>
<thead>
<tr>
<th>Object</th>
<th>Use for the TE Link layer</th>
</tr>
</thead>
<tbody>
<tr>
<td>ifIndex</td>
<td>Each TE Link interface is represented by an ifEntry.</td>
</tr>
<tr>
<td>ifDescr</td>
<td>Description of the TE Link interface.</td>
</tr>
</tbody>
</table>
ifType        The value that is allocated for TE Link is 200
            [IANAifType].

ifSpeed       The total bandwidth in bits per second for use by the
            TE Link layer.

ifPhysAddress Unused.

ifAdminStatus This variable indicates the administrator’s intent as
            to whether TE Link should be enabled, disabled, or
            running in some diagnostic testing mode on this
            interface. Also see [RFC2863].

ifOperStatus  This value reflects the actual or operational status of
            the TE Link on this interface.

ifLastChange  See [RFC2863].

ifInOctets    The number of received octets over the interface, i.e.,
            the number of received octets in all component links
            associated with the interface.

ifOutOctets   The number of transmitted octets over the interface,
            i.e., the number of octets transmitted over all
            component links associated with the interface.

ifInErrors    The number of packets dropped due to uncorrectable
            errors.

ifInUnknownProtos
            The number of received packets discarded during packet
            header validation.

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].

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

ifAlias       The non-volatile ‘alias’ name for the interface, as specified by a network manager.

ifCounterDiscontinuityTime
See [RFC2863].

Support for ifInOctets, ifOutOctets, ifInErrors, ifInUnknownProtos, ifOutErrors, ifHCInOctets, and ifHCOutOctets objects is not required if the encoding type is clear. For other encoding types, traffic counters on a TE link are cumulative for all subinterfaces that it binds together.

8.2. Using ifStackTable

This section describes, by example, how to use the ifStackTable to represent the relationship of TE links with underlying TE-enabled interfaces. Implementors of the stack table for TE link interfaces should look at the appropriate RFC for the service being stacked on TE links. The examples given below are for illustration purposes only.

Example: MPLS is being carried on a bundled TE link. The bundled TE link represents a 1:1 optical transport interface.

In this example, the component link is a TE link. The two component links/TE links are grouped in a bundled link.

+-------------------------------------------------------------------+
| MPLS interface ifType = mpls(166)                                 |
| ifIndex = 1                                                       |
+-------------------------------------------------------------------+
| TE link (bundled link) ifType = teLink(200)                       |
| ifIndex = 2                                                       |
+--------------------------------+-+--------------------------------+
| TE link ifType = teLink(200)   | | TE link ifType = teLink(200)   |
| ifIndex = 3                    | | ifIndex = 4                    |
+--------------------------------+ +--------------------------------+
| Component link                 | | Component link                 |
| ifType = opticalTransport(196) | | ifType = opticalTransport(196) |
| ifIndex = 5                    | | ifIndex = 6                    |
+-------------------------------------------------------------------+
The assignment of the index values could, for example, be:

<table>
<thead>
<tr>
<th>ifIndex</th>
<th>Description</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>mpls</td>
<td>(type 166)</td>
</tr>
<tr>
<td>2</td>
<td>teLink</td>
<td>(type 200)</td>
</tr>
<tr>
<td>3</td>
<td>teLink</td>
<td>(type 200)</td>
</tr>
<tr>
<td>4</td>
<td>teLink</td>
<td>(type 200)</td>
</tr>
<tr>
<td>5</td>
<td>opticalTransport</td>
<td>(type 196)</td>
</tr>
<tr>
<td>6</td>
<td>opticalTransport</td>
<td>(type 196)</td>
</tr>
</tbody>
</table>

The ifStackTable is then used to show the relationships between the various interfaces.

<table>
<thead>
<tr>
<th>ifStackTable Entries</th>
</tr>
</thead>
<tbody>
<tr>
<td>HigherLayer</td>
</tr>
<tr>
<td>0</td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>3</td>
</tr>
<tr>
<td>4</td>
</tr>
<tr>
<td>5</td>
</tr>
<tr>
<td>6</td>
</tr>
</tbody>
</table>

In the case where MPLS is using a single TE link, then the upper TE link layer (link bundle) is not required.

```
+-----------------------------------+        |
| MPLS interface ifType = mpls(166)   |
+-----------------------------------+        |
| TE link ifType = teLink(200)        |
+-----------------------------------+        |
| Component link                     |
| ifType = opticalTransport(196)      |
+-----------------------------------+        |
```

The assignment of the index values could for example be:

<table>
<thead>
<tr>
<th>ifIndex</th>
<th>Description</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>mpls</td>
<td>(type 166)</td>
</tr>
<tr>
<td>2</td>
<td>teLink</td>
<td>(type 200)</td>
</tr>
<tr>
<td>3</td>
<td>opticalTransport</td>
<td>(type 196)</td>
</tr>
</tbody>
</table>
The ifStackTable is then used to show the relationships between the various interfaces.

ifStackTable Entries

<table>
<thead>
<tr>
<th>HigherLayer</th>
<th>LowerLayer</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>0</td>
</tr>
</tbody>
</table>

8.3. Applicability of ifRcvAddressTable

TE link interfaces are logical interfaces with no media-level addresses. As such, the ifRcvAddressTable is not applicable to these interfaces.

9. TE Link MIB Module Definitions

TE-LINK-STD-MIB DEFINITIONS ::= BEGIN

IMPORTS
MODULE-IDENTITY, OBJECT-TYPE, transmission, Integer32, Unsigned32
FROM SNMPv2-SMI

MODULE-COMPLIANCE, OBJECT-GROUP
FROM SNMPv2-CONF

TEXTUAL-CONVENTION, RowStatus, StorageType
FROM SNMPv2-TC

InterfaceIndexOrZero, ifIndex
FROM IF-MIB

InetAddressType, InetAddress
FROM INET-ADDRESS-MIB;

telLinkStdMIB MODULE-IDENTITY
LAST-UPDATED "2005101110000Z" -- 11 October 2005
ORGANIZATION "Multiprotocol Label Switching (MPLS) Working Group"
CONTACT-INFO
"Martin Dubuc
Email: mdubuc@ncf.ca
Thomas D. Nadeau
Email: tnadeau@cisco.com"
DESCRIPTION
"Copyright (C) 2005 The Internet Society. This version of this MIB module is part of RFC 4220; see the RFC itself for full legal notices.

This MIB module contains managed object definitions for MPLS traffic engineering links as defined in 'Link Bundling in MPLS Traffic Engineering (TE)')."

-- Revision history.
REVISION
"200510110000Z" -- 11 October 2005
DESCRIPTION
"Initial version published as RFC 4220."
::= { transmission 200 }

-- Textual Conventions

TeLinkBandwidth ::= TEXTUAL-CONVENTION
STATUS current
DESCRIPTION
"This type is used to represent link bandwidth in bps. This value is represented using a 4 octet IEEE floating point format [IEEE]. The floating point representation is not used to represent fractional value but rather to allow specification of large numbers that cannot be expressed with 32-bit integers."
REFERENCE
"IEEE Standard for Binary Floating-Point Arithmetic, Standard 754-1985"
SYNTAX OCTET STRING (SIZE(4))

TeLinkPriority ::= TEXTUAL-CONVENTION
DISPLAY-HINT "d"
STATUS current
DESCRIPTION
"This type is used to represent a priority. Each connection is assigned a priority. This priority is used when accounting for bandwidth on TE links or component links, for resource allocation and for rerouting purposes. Value 0 is the highest priority. Value 7 is the lowest priority."
TeLinkProtection ::= TEXTUAL-CONVENTION
STATUS current
DESCRIPTION "Link protection."
SYNTAX INTEGER {
    primary(1),
    secondary(2)
}

TeLinkSwitchingCapability ::= TEXTUAL-CONVENTION
STATUS current
DESCRIPTION "Switching capability as specified in the 'OSPF Extensions in Support of Generalized Multi-Protocol Label Switching (GMPLS)' document. The values specified in this document are not contiguous."
SYNTAX INTEGER {
    packetSwitch1(1),
    packetSwitch2(2),
    packetSwitch3(3),
    packetSwitch4(4),
    layer2Switch(51),
    tdm(100),
    lambdaSwitch(150),
    fiberSwitch(200)
}

TeLinkEncodingType ::= TEXTUAL-CONVENTION
STATUS current
DESCRIPTION "Link encoding type as specified in 'Generalized Multi-Protocol Label Switching (GMPLS) Signaling Functional Description' document. The values specified in this document are not contiguous."
SYNTAX INTEGER {
    packet(1),
    ethernet(2),
    ansiEtsiPdh(3),
    sdhItuSonetAnsi(5),
    digitalWrapper(7),
    lambda(8),
    fiber(9),
    fiberChannel(11)
}

TeLinkSonetSdhIndication ::= TEXTUAL-CONVENTION
STATUS       current
DESCRIPTION   "This convention is used to indicate whether the interface supports Standard or Arbitrary SONET/SDH. To simplify the mapping process, the values used in this textual convention match the values specified in the interface switching capability specific information field, i.e., 0 for Standard SONET/SDH and 1 for Arbitrary SONET/SDH."

REFERENCE   "OSPF Extensions in Support of Generalized Multi-Protocol Label Switching (GMPLS), RFC 4203"

SYNTAX       INTEGER {
                      standard(0),
                      arbitrary(1)
                   }

-- Top level components of this MIB module

-- Notifications
telLinkNotifications OBJECT IDENTIFIER ::= { telLinkStdMIB 0 }

-- Tables, Scalars
telLinkObjects OBJECT IDENTIFIER ::= { telLinkStdMIB 1 }

-- Conformance
telLinkConformance OBJECT IDENTIFIER ::= { telLinkStdMIB 2 }

-- TE Link Table
telLinkTable OBJECT-TYPE
SYNTAX       SEQUENCE OF TelLinkEntry
MAX-ACCESS   not-accessible
STATUS       current
DESCRIPTION   "This table specifies the grouping of component links into TE links and the grouping of TE links into bundled links."
::= { telLinkObjects 1 }

telLinkEntry OBJECT-TYPE
SYNTAX       TelLinkEntry
MAX-ACCESS   not-accessible
STATUS       current
DESCRIPTION   "An entry in this table exists for each ifEntry with an ifType of teLink(200), i.e., for every TE link. An ifEntry in the ifTable must exist before a telLinkEntry is created with the corresponding ifIndex. If a TE link entry in the ifTable is destroyed, then so is the corresponding entry in the telLinkTable. The administrative and operational status values are controlled from the ifEntry."
INDEX             { ifIndex }  
 ::= { teLinkTable 1 }

TeLinkEntry ::= SEQUENCE {  
  teLinkAddressType                 InetAddressType,  
  teLinkLocalIpAddr                 InetAddress,  
  teLinkRemoteIpAddr                InetAddress,  
  teLinkMetric                      Unsigned32,  
  teLinkMaximumReservableBandwidth  TeLinkBandwidth,  
  teLinkProtectionType              INTEGER,  
  teLinkWorkingPriority             TeLinkPriority,  
  teLinkResourceClass               Unsigned32,  
  teLinkIncomingIfId                Integer32,  
  teLinkOutgoingIfId                InterfaceIndexOrZero,  
  teLinkRowStatus                   RowStatus,  
  teLinkStorageType                 StorageType  
  }

teLinkAddressType OBJECT-TYPE  
 SYNTAX       InetAddressType  
 MAX-ACCESS   read-create  
 STATUS       current  
 DESCRIPTION  
   "The type of Internet address for the TE link."  
 ::= { teLinkEntry 1 }

teLinkLocalIpAddr 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 the teLinkAddressType object.

   For IPv4 and IPv6 numbered links, this object represents the local IP address associated with the TE link. For an unnumbered link, the local address is of type unknown, this object is set to the zero length string, and the teLinkOutgoingIfId object then identifies the unnumbered address.

   If the TE link is a Forwarding Adjacency (FA), the local IP address is set to the head-end address of the FA-LSP.

   If ipAddrTable is implemented, this object must have the same value as the ipAdEntAddr object that belongs to the row in ipAddrTable where ipAdEntIfIndex is equal to
ifIndex.
 ::= { teLinkEntry 2 }

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

The remote IP address associated with the TE link (IPv4 and
IPv6 numbered links). For an unnumbered link, the remote
address is of type unknown, this object is set to the
zero length string, and the teLinkIncomingIfId object then
identifies the unnumbered address.

If the TE link is a Forwarding Adjacency, the remote IP
address is set to the tail-end address of the FA-LSP."
 ::= { teLinkEntry 3 }

teLinkMetric OBJECT-TYPE
SYNTAX        Unsigned32
MAX-ACCESS    read-create
STATUS        current
DESCRIPTION
 "The traffic engineering metric for the TE link is
derived from its component links. All component links
within the TE link must have the same traffic
engineering metric."
REFERENCE
 "Link Bundling in MPLS Traffic Engineering (TE), RFC 4201"
 ::= { teLinkEntry 4 }

teLinkMaximumReservableBandwidth OBJECT-TYPE
SYNTAX        TeLinkBandwidth
UNITS         "bps"
MAX-ACCESS    read-only
STATUS        current
DESCRIPTION
 "This attribute specifies the maximum reservable bandwidth on
the TE link. This is the union of the maximum reservable
bandwidth of all the component links within the
TE link that can be used to carry live traffic."
REFERENCE
 "OSPF Extensions in Support of Generalized Multi-Protocol
Label Switching (GMPLS), RFC 4203"
::= { teLinkEntry 5 }

teLinkProtectionType OBJECT-TYPE
SYNTAX INTEGER {
  extraTraffic(1),
  unprotected(2),
  shared(3),
  dedicated1For1(4),
  dedicated1Plus1(5),
  enhanced(6)
}
MAX-ACCESS read-create
STATUS current
DESCRIPTION "This attribute specifies the link protection type of the
TE link. Descriptions of the different protection types can
be found in the ‘Routing Extensions in Support of
Generalized Multi-Protocol Label Switching (GMPLS)’
document."
REFERENCE
"OSPF Extensions in Support of Generalized Multi-Protocol
Label Switching (GMPLS), RFC 4203 and
Routing Extensions in Support of Generalized Multi-Protocol
Label Switching (GMPLS), RFC 4202"
::= { teLinkEntry 6 }

teLinkWorkingPriority OBJECT-TYPE
SYNTAX TeLinkPriority
MAX-ACCESS read-create
STATUS current
DESCRIPTION "This object represents a priority value such that a new
connection with a higher priority, i.e., numerically lower
than this value, is guaranteed to be setup on a primary
link and not on a secondary link."
REFERENCE
"OSPF Extensions in Support of Generalized Multi-Protocol
Label Switching (GMPLS), RFC 4203"
::= { teLinkEntry 7 }

teLinkResourceClass OBJECT-TYPE
SYNTAX Unsigned32
MAX-ACCESS read-create
STATUS current
DESCRIPTION "This attribute specifies the TE link resource class.
The resource class is a 32 bit bitfield. The resource class
for a link bundle is derived from the resource class of its
TE links. All TE links within a link bundle must have the same resource class. Encoding of the resource class is described in the "Traffic Engineering (TE) Extensions to OSPF Version 2" document.

REFERENCE
"Link Bundling in MPLS Traffic Engineering (TE), RFC 4201 and Traffic Engineering (TE) Extensions to OSPF Version 2, RFC 3630"

 ::= { teLinkEntry 8 }

teLinkIncomingIfId OBJECT-TYPE
SYNTAX Integer32 (0..2147483647)
MAX-ACCESS read-create
STATUS current
DESCRIPTION
"For unnumbered links, the incoming interface is set to the outgoing interface identifier chosen by the neighboring LSR for the reverse link corresponding to this TE link. If the link is numbered, the value of this object is 0 and the address is stored in the teLinkRemoteIpAddr instead."

REFERENCE
"Link Bundling in MPLS Traffic Engineering (TE), RFC 4201"

 ::= { teLinkEntry 9 }

teLinkOutgoingIfId OBJECT-TYPE
SYNTAX InterfaceIndexOrZero
MAX-ACCESS read-create
STATUS current
DESCRIPTION
"If the link is unnumbered, the outgoing interface identifier is set to the outgoing interface identifier chosen for the TE link by the advertising LSR. If the link is numbered, the value of this object is 0 and the address is stored in the teLinkLocalIpAddr instead."

REFERENCE
"Link Bundling in MPLS Traffic Engineering (TE), RFC 4201"

 ::= { teLinkEntry 10 }

teLinkRowStatus 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 status is active(1)."

 ::= { teLinkEntry 11 }
teLinkStorageType OBJECT-TYPE
SYNTAX StorageType
MAX-ACCESS read-create
STATUS current
DESCRIPTION "The storage type for this conceptual row in the teLinkTable. Conceptual rows having the value 'permanent' need not allow write-access to any columnar object in the row."
 ::= { teLinkEntry 12 }

-- End of teLinkTable

-- TE Link Descriptor Table

teLinkDescriptorTable OBJECT-TYPE
SYNTAX SEQUENCE OF TeLinkDescriptorEntry
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION "This table specifies the interface switching capability descriptors associated with the TE links."
 ::= { teLinkObjects 2 }

teLinkDescriptorEntry OBJECT-TYPE
SYNTAX TeLinkDescriptorEntry
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION "An entry in this table is created for every TE link interface switching capability descriptor. An ifEntry in the ifTable must exist before a teLinkDescriptorEntry using the same ifIndex is created. ifType of ifEntry must be teLink(200). If a TE link entry in the ifTable is destroyed, then so are all of the entries in the teLinkDescriptorTable that use the ifIndex of this TE link."
INDEX { ifIndex, teLinkDescriptorId }
 ::= { teLinkDescriptorTable 1 }

TeLinkDescriptorEntry ::= SEQUENCE {
   teLinkDescriptorId               Unsigned32,
   teLinkDescrSwitchingCapability   TeLinkSwitchingCapability,
   teLinkDescrEncodingType          TeLinkEncodingType,
   teLinkDescrMinLspBandwidth       TeLinkBandwidth,
   teLinkDescrMaxLspBandwidthPrio0  TeLinkBandwidth,
   teLinkDescrMaxLspBandwidthPrio1  TeLinkBandwidth,
   teLinkDescrMaxLspBandwidthPrio2  TeLinkBandwidth,
   ...
teLinkDescrMaxLspBandwidthPrio3  TeLinkBandwidth,
teLinkDescrMaxLspBandwidthPrio4  TeLinkBandwidth,
teLinkDescrMaxLspBandwidthPrio5  TeLinkBandwidth,
teLinkDescrMaxLspBandwidthPrio6  TeLinkBandwidth,
teLinkDescrMaxLspBandwidthPrio7  TeLinkBandwidth,
teLinkDescrInterfaceMtu  Unsigned32,
teLinkDescrIndication  TeLinkSonetSdhIndication,
teLinkDescrRowStatus  RowStatus,
teLinkDescrStorageType  StorageType
}

teLinkDescriptorId OBJECT-TYPE
SYNTAX  Unsigned32 (1..4294967295)
MAX-ACCESS  not-accessible
STATUS  current
DESCRIPTION
  "This object specifies the link descriptor identifier."
 ::= { teLinkDescriptorEntry 1 }

teLinkDescrSwitchingCapability OBJECT-TYPE
SYNTAX  TeLinkSwitchingCapability
MAX-ACCESS  read-create
STATUS  current
DESCRIPTION
  "This attribute specifies interface switching capability of
  the TE link, which is derived from its component links."
REFERENCE
  "OSPF Extensions in Support of Generalized Multi-Protocol
  Label Switching (GMPLS), RFC 4203"
 ::= { teLinkDescriptorEntry 2 }

teLinkDescrEncodingType OBJECT-TYPE
SYNTAX  TeLinkEncodingType
MAX-ACCESS  read-create
STATUS  current
DESCRIPTION
  "This attribute specifies the TE link encoding type."
REFERENCE
  "Generalized Multi-Protocol Label Switching (GMPLS)
  Signaling Functional Description, RFC 3471"
 ::= { teLinkDescriptorEntry 3 }

teLinkDescrMinLspBandwidth OBJECT-TYPE
SYNTAX  TeLinkBandwidth
UNITS  "bps"
MAX-ACCESS  read-create
STATUS  current
DESCRIPTION
"This attribute specifies the minimum LSP bandwidth on the TE link. This is derived from the union of the minimum LSP bandwidth of all the component links associated with the TE link that can be used to carry live traffic."

REFERENCE
"OSPF Extensions in Support of Generalized Multi-Protocol Label Switching (GMPLS), RFC 4203"

::= { teLinkDescriptorEntry 4 }

teLinkDescrMaxLspBandwidthPrio0 OBJECT-TYPE
SYNTAX TeLinkBandwidth
UNITS "bps"
MAX-ACCESS read-create
STATUS current
DESCRIPTION
"This attribute specifies the maximum LSP bandwidth at priority 0 on the TE link. This is the union of the maximum LSP bandwidth at priority 0 of all the component links within the TE link that can be used to carry live traffic."

REFERENCE
"OSPF Extensions in Support of Generalized Multi-Protocol Label Switching (GMPLS), RFC 4203"

::= { teLinkDescriptorEntry 5 }

teLinkDescrMaxLspBandwidthPrio1 OBJECT-TYPE
SYNTAX TeLinkBandwidth
UNITS "bps"
MAX-ACCESS read-create
STATUS current
DESCRIPTION
"This attribute specifies the maximum LSP bandwidth at priority 1 on the TE link. This is the union of the maximum LSP bandwidth at priority 1 of all the component links within the TE link that can be used to carry live traffic."

REFERENCE
"OSPF Extensions in Support of Generalized Multi-Protocol Label Switching (GMPLS), RFC 4203"

::= { teLinkDescriptorEntry 6 }

teLinkDescrMaxLspBandwidthPrio2 OBJECT-TYPE
SYNTAX TeLinkBandwidth
UNITS "bps"
MAX-ACCESS read-create
STATUS current
DESCRIPTION
"This attribute specifies the maximum LSP bandwidth at priority 2 on the TE link. This is the union of the maximum
LSP bandwidth at priority 2 of all the component links within the TE link that can be used to carry live traffic."

REFERENCE
"OSPF Extensions in Support of Generalized Multi-Protocol Label Switching (GMPLS), RFC 4203"
::= { teLinkDescriptorEntry 7 }

teLinkDescrMaxLspBandwidthPrio3 OBJECT-TYPE
SYNTAX TeLinkBandwidth
UNITS "bps"
MAX-ACCESS read-create
STATUS current
DESCRIPTION "This attribute specifies the maximum LSP bandwidth at priority 3 on the TE link. This is the union of the maximum LSP bandwidth at priority 3 of all the component links within the TE link that can be used to carry live traffic."

REFERENCE
"OSPF Extensions in Support of Generalized Multi-Protocol Label Switching (GMPLS), RFC 4203"
::= { teLinkDescriptorEntry 8 }

teLinkDescrMaxLspBandwidthPrio4 OBJECT-TYPE
SYNTAX TeLinkBandwidth
UNITS "bps"
MAX-ACCESS read-create
STATUS current
DESCRIPTION "This attribute specifies the maximum LSP bandwidth at priority 4 on the TE link. This is the union of the maximum LSP bandwidth at priority 4 of all the component links within the TE link that can be used to carry live traffic."

REFERENCE
"OSPF Extensions in Support of Generalized Multi-Protocol Label Switching (GMPLS), RFC 4203"
::= { teLinkDescriptorEntry 9 }

teLinkDescrMaxLspBandwidthPrio5 OBJECT-TYPE
SYNTAX TeLinkBandwidth
UNITS "bps"
MAX-ACCESS read-create
STATUS current
DESCRIPTION "This attribute specifies the maximum LSP bandwidth at priority 5 on the TE link. This is the union of the maximum LSP bandwidth at priority 5 of all the component links within the TE link that can be used to carry live traffic."

REFERENCE
"OSPF Extensions in Support of Generalized Multi-Protocol Label Switching (GMPLS), RFC 4203"
::= { teLinkDescriptorEntry 10 }

teLinkDescrMaxLspBandwidthPrio6 OBJECT-TYPE
SYNTAX TeLinkBandwidth
UNITS "bps"
MAX-ACCESS read-create
STATUS current
DESCRIPTION
"This attribute specifies the maximum LSP bandwidth at priority 6 on the TE link. This is the union of the maximum LSP bandwidth at priority 6 of all the component links within the TE link that can be used to carry live traffic."
REFERENCE
"OSPF Extensions in Support of Generalized Multi-Protocol Label Switching (GMPLS), RFC 4203"
::= { teLinkDescriptorEntry 11 }

teLinkDescrMaxLspBandwidthPrio7 OBJECT-TYPE
SYNTAX TeLinkBandwidth
UNITS "bps"
MAX-ACCESS read-create
STATUS current
DESCRIPTION
"This attribute specifies the maximum LSP bandwidth at priority 7 on the TE link. This is the union of the maximum LSP bandwidth at priority 7 of all the component links within the TE link that can be used to carry live traffic."
REFERENCE
"OSPF Extensions in Support of Generalized Multi-Protocol Label Switching (GMPLS), RFC 4203"
::= { teLinkDescriptorEntry 12 }

teLinkDescrInterfaceMtu OBJECT-TYPE
SYNTAX Unsigned32 (1..65535)
MAX-ACCESS read-create
STATUS current
DESCRIPTION
"This attribute specifies the interface MTU for the TE link descriptor."
REFERENCE
"OSPF Extensions in Support of Generalized Multi-Protocol Label Switching (GMPLS), RFC 4203"
::= { teLinkDescriptorEntry 13 }

teLinkDescrIndication OBJECT-TYPE
SYNTAX TeLinkSonetSdhIndication
MAX-ACCESS read-create
STATUS current
DESCRIPTION "This attribute specifies whether this interface supports Standard or Arbitrary SONET/SDH."
REFERENCE "OSPF Extensions in Support of Generalized Multi-Protocol Label Switching (GMPLS), RFC 4203"
::= { teLinkDescriptorEntry 14 }

teLinkDescrRowStatus 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. No read-create object can be changed if teLinkDescrRowStatus is in the active(1) state."
::= { teLinkDescriptorEntry 15 }

teLinkDescrStorageType OBJECT-TYPE
SYNTAX StorageType
MAX-ACCESS read-create
STATUS current
DESCRIPTION "The storage type for this conceptual row in the teLinkDescriptorTable. Conceptual rows having the value 'permanent' need not allow write-access to any columnar object in the row."
::= { teLinkDescriptorEntry 16 }

-- End of teLinkDescriptorTable

-- TE Link Shared Risk Link Group Table

teLinkSrlgTable OBJECT-TYPE
SYNTAX SEQUENCE OF TeLinkSrlgEntry
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION "This table specifies the SRLGs associated with TE links."
::= { teLinkObjects 3 }

teLinkSrlgEntry OBJECT-TYPE
SYNTAX TeLinkSrlgEntry
MAX-ACCESS not-accessible
An entry in this table contains information about an SRLG associated with a TE link. An ifEntry in the ifTable must exist before a teLinkSrlgEntry using the same ifIndex is created. The ifType of ifEntry must be teLink(200). If a TE link entry in the ifTable is destroyed, then so are all of the entries in the teLinkSrlgTable that use the ifIndex of this TE link.

INDEX { ifIndex, teLinkSrlg }
::= { teLinkSrlgTable 1 }

TeLinkSrlgEntry ::= SEQUENCE {
    teLinkSrlg            Unsigned32,
    teLinkSrlgRowStatus   RowStatus,
    teLinkSrlgStorageType StorageType
}

teLinkSrlg OBJECT-TYPE
SYNTAX        Unsigned32 (0..4294967295)
MAX-ACCESS    not-accessible
STATUS        current
DESCRIPTION
    "This identifies an SRLG supported by the TE link. An SRLG is identified with a 32-bit number that is unique within an IGP domain. Zero is a valid SRLG number."
REFERENCE
    "OSPF Extensions in Support of Generalized Multi-Protocol Label Switching (GMPLS), RFC 4203"
::= { teLinkSrlgEntry 1 }

teLinkSrlgRowStatus 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. No read-create object can be modified if teLinkSrlgRowStatus is active(1)."
::= { teLinkSrlgEntry 2 }

teLinkSrlgStorageType OBJECT-TYPE
SYNTAX        StorageType
MAX-ACCESS    read-create
STATUS        current
DESCRIPTION
    "The storage type for this conceptual row in the
teLinkSrlgTable. Conceptual rows having the value
'permanent' need not allow write-access to any
columnar object in the row.
::= { teLinkSrlgEntry 3 }

-- End of teLinkSrlgTable

-- TE Link Bandwidth Table

teLinkBandwidthTable OBJECT-TYPE
SYNTAX        SEQUENCE OF TeLinkBandwidthEntry
MAX-ACCESS    not-accessible
STATUS        current
DESCRIPTION    "This table specifies the priority-based bandwidth table
for TE links."
::= { teLinkObjects 4 }

teLinkBandwidthEntry OBJECT-TYPE
SYNTAX        TeLinkBandwidthEntry
MAX-ACCESS    not-accessible
STATUS        current
DESCRIPTION    "An entry in this table contains information about
the priority-based bandwidth of TE links. An ifEntry in the
ifTable must exist before a teLinkBandwidthEntry using the
same ifIndex is created. The ifType of ifEntry must be
telLink(200). If a TE link entry in the ifTable is destroyed,
then so are all of the entries in the teLinkBandwidthTable
that use the ifIndex of this TE link."
INDEX         { ifIndex, teLinkBandwidthPriority }
::= { teLinkBandwidthTable 1 }

TeLinkBandwidthEntry ::= SEQUENCE {
  teLinkBandwidthPriority TeLinkPriority,
  teLinkBandwidthUnreserved TeLinkBandwidth,
  teLinkBandwidthRowStatus RowStatus,
  teLinkBandwidthStorageType StorageType
}
OSPF Version 2’ document.

REFERENCE
"OSPF Extensions in Support of Generalized Multi-Protocol Label Switching (GMPLS), RFC 4203 and Traffic Engineering (TE) Extensions to OSPF Version 2, RFC 3630"
 ::= { teLinkBandwidthEntry 1 }

teLinkBandwidthUnreserved OBJECT-TYPE
SYNTAX TeLinkBandwidth
UNITS "bps"
MAX-ACCESS read-only
STATUS current
DESCRIPTION "This attribute specifies the TE link unreserved bandwidth at priority p. It is the sum of the unreserved bandwidths at priority p of all component links associated with the TE link (excluding all links that are strictly used as protecting links)."
REFERENCE "Link Bundling in MPLS Traffic Engineering (TE), RFC 4201"
 ::= { teLinkBandwidthEntry 2 }

teLinkBandwidthRowStatus 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. No read-create object can be modified when teLinkBandwidthRowStatus is active(1)."
 ::= { teLinkBandwidthEntry 3 }

teLinkBandwidthStorageType OBJECT-TYPE
SYNTAX StorageType
MAX-ACCESS read-create
STATUS current
DESCRIPTION "The storage type for this conceptual row in the teLinkBandwidthTable. Conceptual rows having the value 'permanent’ need not allow write-access to any columnar object in the row."
 ::= { teLinkBandwidthEntry 4 }

-- End of teLinkBandwidthTable

-- Component Link Table
componentLinkTable OBJECT-TYPE
SYNTAX         SEQUENCE OF ComponentLinkEntry
MAX-ACCESS     not-accessible
STATUS         current
DESCRIPTION    "This table specifies the component link parameters."
::= { teLinkObjects 5 }

componentLinkEntry  OBJECT-TYPE
SYNTAX          ComponentLinkEntry
MAX-ACCESS      not-accessible
STATUS          current
DESCRIPTION     "An entry in this table exists for each ifEntry that
represents a component link. An ifEntry must exist in
the ifTable before a componentLinkEntry is created with
the corresponding ifIndex. ifEntry's ifType can be
of any interface type that has been defined for TE Link
interworking. Examples include ATM, Frame Relay, Ethernet,
etc. If an entry representing a component link is destroyed
in the ifTable, then so is the corresponding entry in the
componentLinkTable. The administrative and operational
status values are controlled from the ifEntry."
INDEX          { ifIndex }
::= { componentLinkTable 1 }

ComponentLinkEntry ::= SEQUENCE {
  componentLinkMaxResBandwidth     TeLinkBandwidth,
  componentLinkPreferredProtection TeLinkProtection,
  componentLinkCurrentProtection   TeLinkProtection,
  componentLinkRowStatus           RowStatus,
  componentLinkStorageType         StorageType
}

componentLinkMaxResBandwidth OBJECT-TYPE
SYNTAX         TeLinkBandwidth
UNITS          "bps"
MAX-ACCESS     read-create
STATUS         current
DESCRIPTION    "This attribute specifies the maximum reservable bandwidth on
the component link."
REFERENCE      "OSPF Extensions in Support of Generalized Multi-Protocol
Label Switching (GMPLS), RFC 4203"
::= { componentLinkEntry 1 }

componentLinkPreferredProtection OBJECT-TYPE
This attribute specifies whether this component link is a primary or secondary entity.

componentLinkCurrentProtection OBJECT-TYPE
SYNTAX TeLinkProtection
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"This attribute specifies whether this component link is currently used as primary or secondary link."
::= { componentLinkEntry 3 }
"This table specifies the interface switching capability
descriptors associated with the component links."
::= { teLinkObjects 6 }

componentLinkDescriptorEntry OBJECT-TYPE
SYNTAX        ComponentLinkDescriptorEntry
MAX-ACCESS    not-accessible
STATUS        current
DESCRIPTION
"An entry in this table is created for every component link
descriptor. An ifEntry in the ifTable must exist before a
componentLinkDescriptorEntry using the same ifIndex is
created. ifEntry’s ifType can be of any interface type that
has been defined for TE Link interworking. Examples include
ATM, Frame Relay, Ethernet, etc. If a component link entry
in the ifTable is destroyed, then so are all entries in the
componentLinkDescriptorTable that use the ifIndex of this
component link."
INDEX         { ifIndex, componentLinkDescrId }
::= { componentLinkDescriptorTable 1 }

ComponentLinkDescriptorEntry ::= SEQUENCE {
  componentLinkDescrId                    Unsigned32,
  componentLinkDescrSwitchingCapability   TeLinkSwitchingCapability,
  componentLinkDescrEncodingType          TeLinkEncodingType,
  componentLinkDescrMinLspBandwidth       TeLinkBandwidth,
  componentLinkDescrMaxLspBandwidthPrio0  TeLinkBandwidth,
  componentLinkDescrMaxLspBandwidthPrio1  TeLinkBandwidth,
  componentLinkDescrMaxLspBandwidthPrio2  TeLinkBandwidth,
  componentLinkDescrMaxLspBandwidthPrio3  TeLinkBandwidth,
  componentLinkDescrMaxLspBandwidthPrio4  TeLinkBandwidth,
  componentLinkDescrMaxLspBandwidthPrio5  TeLinkBandwidth,
  componentLinkDescrMaxLspBandwidthPrio6  TeLinkBandwidth,
  componentLinkDescrMaxLspBandwidthPrio7  TeLinkBandwidth,
  componentLinkDescrInterfaceMtu          Unsigned32,
  componentLinkDescrIndicator             TeLinkSonetSdhIndication,
  componentLinkDescrRowStatus             RowStatus,
  componentLinkDescrStorageType           StorageType
}

componentLinkDescrId OBJECT-TYPE
SYNTAX        Unsigned32 (1..4294967295)
MAX-ACCESS    not-accessible
STATUS        current
DESCRIPTION
"This object specifies the link descriptor identifier."
::= { componentLinkDescriptorEntry 1 }
componentLinkDescrSwitchingCapability OBJECT-TYPE
SYNTAX     TeLinkSwitchingCapability
MAX-ACCESS read-create
STATUS     current
DESCRIPTION  "This attribute specifies link multiplexing capabilities of
the component link."
REFERENCE
"OSPF Extensions in Support of Generalized Multi-Protocol
Label Switching (GMPLS), RFC 4203"
::= { componentLinkDescriptorEntry 2 }

componentLinkDescrEncodingType OBJECT-TYPE
SYNTAX     TeLinkEncodingType
MAX-ACCESS read-create
STATUS     current
DESCRIPTION  "This attribute specifies the component link encoding type."
REFERENCE
"Generalized Multi-Protocol Label Switching (GMPLS) Signaling
Functional Description, RFC 3471"
::= { componentLinkDescriptorEntry 3 }

componentLinkDescrMinLspBandwidth OBJECT-TYPE
SYNTAX     TeLinkBandwidth
UNITS       "bps"
MAX-ACCESS read-create
STATUS     current
DESCRIPTION  "This attribute specifies the minimum LSP bandwidth on
the component link."
REFERENCE
"OSPF Extensions in Support of Generalized Multi-Protocol
Label Switching (GMPLS), RFC 4203"
::= { componentLinkDescriptorEntry 4 }

componentLinkDescrMaxLspBandwidthPrio0 OBJECT-TYPE
SYNTAX     TeLinkBandwidth
UNITS       "bps"
MAX-ACCESS read-create
STATUS     current
DESCRIPTION  "This attribute specifies the maximum LSP bandwidth at
priority 0 on the component link."
REFERENCE
"OSPF Extensions in Support of Generalized Multi-Protocol
Label Switching (GMPLS), RFC 4203"
::= { componentLinkDescriptorEntry 5 }
componentLinkDescrMaxLspBandwidthPrio1 OBJECT-TYPE
SYNTAX        TeLinkBandwidth
UNITS         "bps"
MAX-ACCESS    read-create
STATUS        current
DESCRIPTION    "This attribute specifies the maximum LSP bandwidth at priority 1 on the component link."
REFERENCE     "OSPF Extensions in Support of Generalized Multi-Protocol Label Switching (GMPLS), RFC 4203"
 ::= { componentLinkDescriptorEntry 6 }

componentLinkDescrMaxLspBandwidthPrio2 OBJECT-TYPE
SYNTAX        TeLinkBandwidth
UNITS         "bps"
MAX-ACCESS    read-create
STATUS        current
DESCRIPTION    "This attribute specifies the maximum LSP bandwidth at priority 2 on the component link."
REFERENCE     "OSPF Extensions in Support of Generalized Multi-Protocol Label Switching (GMPLS), RFC 4203"
 ::= { componentLinkDescriptorEntry 7 }

componentLinkDescrMaxLspBandwidthPrio3 OBJECT-TYPE
SYNTAX        TeLinkBandwidth
UNITS         "bps"
MAX-ACCESS    read-create
STATUS        current
DESCRIPTION    "This attribute specifies the maximum LSP bandwidth at priority 3 on the component link."
REFERENCE     "OSPF Extensions in Support of Generalized Multi-Protocol Label Switching (GMPLS), RFC 4203"
 ::= { componentLinkDescriptorEntry 8 }

componentLinkDescrMaxLspBandwidthPrio4 OBJECT-TYPE
SYNTAX        TeLinkBandwidth
UNITS         "bps"
MAX-ACCESS    read-create
STATUS        current
DESCRIPTION    "This attribute specifies the maximum LSP bandwidth at priority 4 on the component link."
REFERENCE
componentLinkDescrMaxLspBandwidthPrio5 OBJECT-TYPE
SYNTAX TeLinkBandwidth
UNITS "thousand bps"
MAX-ACCESS read-create
STATUS current
DESCRIPTION "This attribute specifies the maximum LSP bandwidth at priority 5 on the component link."
REFERENCE "OSPF Extensions in Support of Generalized Multi-Protocol Label Switching (GMPLS), RFC 4203"
 ::= { componentLinkDescriptorEntry 9 }

cOMPONENTLINKDESCRMAXLSPBANDWIDTHPrio6 OBJECT-TYPE
SYNTAX TeLinkBandwidth
UNITS "bps"
MAX-ACCESS read-create
STATUS current
DESCRIPTION "This attribute specifies the maximum LSP bandwidth at priority 6 on the component link."
REFERENCE "OSPF Extensions in Support of Generalized Multi-Protocol Label Switching (GMPLS), RFC 4203"
 ::= { componentLinkDescriptorEntry 10 }

cOMPONENTLINKDESCRMAXLSPBANDWIDTHPrio7 OBJECT-TYPE
SYNTAX TeLinkBandwidth
UNITS "bps"
MAX-ACCESS read-create
STATUS current
DESCRIPTION "This attribute specifies the maximum LSP bandwidth at priority 7 on the component link."
REFERENCE "OSPF Extensions in Support of Generalized Multi-Protocol Label Switching (GMPLS), RFC 4203"
 ::= { componentLinkDescriptorEntry 11 }

componentLinkDescrInterfaceMtu OBJECT-TYPE
SYNTAX Unsigned32 (1..65535)
MAX-ACCESS read-create
STATUS current
DESCRIPTION
"This attribute specifies the interface MTU for the component link descriptor."
REFERENCE
"OSPF Extensions in Support of Generalized Multi-Protocol Label Switching (GMPLS), RFC 4203"
::= { componentLinkDescriptorEntry 13 }

componentLinkDescrIndication OBJECT-TYPE
SYNTAX        TelLinkSonetSdhIndication
MAX-ACCESS    read-create
STATUS        current
DESCRIPTION
"This attribute specifies whether this interface supports Standard or Arbitrary SONET/SDH."
REFERENCE
"OSPF Extensions in Support of Generalized Multi-Protocol Label Switching (GMPLS), RFC 4203"
::= { componentLinkDescriptorEntry 14 }

componentLinkDescrRowStatus 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. No read-create object can be modified when componentLinkDescrRowStatus is active(1)."
::= { componentLinkDescriptorEntry 15 }

componentLinkDescrStorageType OBJECT-TYPE
SYNTAX        StorageType
MAX-ACCESS    read-create
STATUS        current
DESCRIPTION
"The storage type for this conceptual row in the componentLinkDescriptorTable. Conceptual rows having the value ‘permanent’ need not allow write-access to any columnar object in the row."
::= { componentLinkDescriptorEntry 16 }

-- End of componentLinkDescriptorTable

-- Component Link Bandwidth Table

componentLinkBandwidthTable OBJECT-TYPE
SYNTAX        SEQUENCE OF ComponentLinkBandwidthEntry
This table specifies the priority-based bandwidth for component links.

::= { teLinkObjects 7 }

componentLinkBandwidthEntry OBJECT-TYPE
SYNTAX        ComponentLinkBandwidthEntry
MAX-ACCESS    not-accessible
STATUS        current
DESCRIPTION
 "An entry in this table contains information about the priority-based bandwidth on component links. An ifEntry in the ifTable must exist before a componentLinkBandwidthEntry using the same ifIndex is created. If an ifEntry’s ifType can be of any interface type that has been defined for TE Link interworking. Examples include ATM, Frame Relay, Ethernet, etc. If a component link entry in the ifTable is destroyed, then so are all entries in the componentLinkBandwidthTable that use the ifIndex of this component link."
INDEX         { ifIndex, componentLinkBandwidthPriority }
::= { componentLinkBandwidthTable 1 }

ComponentLinkBandwidthEntry ::= SEQUENCE {
  componentLinkBandwidthPriority    TeLinkPriority,
  componentLinkBandwidthUnreserved  TeLinkBandwidth,
  componentLinkBandwidthRowStatus   RowStatus,
  componentLinkBandwidthStorageType StorageType
}

componentLinkBandwidthPriority OBJECT-TYPE
SYNTAX        TeLinkPriority
MAX-ACCESS    not-accessible
STATUS        current
DESCRIPTION
 "This attribute specifies the priority. A value of 0 is valid as specified in the ’Traffic Engineering (TE) Extensions to OSPF Version 2’ document."
REFERENCE
 "OSPF Extensions in Support of Generalized Multi-Protocol Label Switching (GMPLS), RFC 4203 and Traffic Engineering (TE) Extensions to OSPF Version 2, RFC 3630"
::= { componentLinkBandwidthEntry 1 }

componentLinkBandwidthUnreserved OBJECT-TYPE
SYNTAX TeLinkBandwidth
UNITS "bps"
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"This attribute specifies the component link unreserved bandwidth at priority p."
REFERENCE
"OSPF Extensions in Support of Generalized Multi-Protocol Label Switching (GMPLS), RFC 4203"
::= { componentLinkBandwidthEntry 2 }

componentLinkBandwidthRowStatus 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. No read-create object can be modified when componentLinkBandwidthRowStatus is active(1)."
::= { componentLinkBandwidthEntry 3 }

componentLinkBandwidthStorageType OBJECT-TYPE
SYNTAX StorageType
MAX-ACCESS read-create
STATUS current
DESCRIPTION
"The storage type for this conceptual row in the componentLinkBandwidthTable. Conceptual rows having the value ‘permanent’ need not allow write-access to any columnar object in the row."
::= { componentLinkBandwidthEntry 4 }

-- End of componentLinkBandwidthTable

-- Module compliance

telLinkCompliances
OBJECT IDENTIFIER ::= { telLinkConformance 1 }

telLinkGroups
OBJECT IDENTIFIER ::= { telLinkConformance 2 }

telLinkModuleFullCompliance MODULE-COMPLIANCE
STATUS current
DESCRIPTION
"Compliance statement for agents that support read-create so that both configuration and monitoring of TE links can be accomplished via this MIB module."

MODULE -- this module

MANDATORY-GROUPS    { teLinkGroup,  
                      teLinkBandwidthGroup,  
                      componentLinkBandwidthGroup }  

GROUP teLinkSrlgGroup
DESCRIPTION
"This group is mandatory for GMPLS enabled devices."

GROUP teLinkPscGroup
DESCRIPTION
"This group is mandatory for devices that support the packet switching capability."

GROUP teLinkTdmGroup
DESCRIPTION
"This group is mandatory for devices that support the TDM switching capability."

-- teLinkTable

OBJECT      teLinkAddressType
SYNTAX      INTEGER { unknown(0), ipv4(1), ipv6(2) }
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      teLinkLocalIpAddr
SYNTAX      InetAddress (SIZE(0|4|16))
DESCRIPTION
"Size of TE link IP address depends on type of TE link. TE 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      teLinkRemoteIpAddr
SYNTAX      InetAddress (SIZE(0|4|16))
DESCRIPTION
"Size of TE link IP address depends on type of TE link. TE 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     teLinkRowStatus
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."

-- teLinkDescriptorTable

OBJECT     teLinkDescrRowStatus
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."

-- teLinkSrlgTable

OBJECT     teLinkSrlgRowStatus
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."

-- teLinkBandwidthTable

OBJECT     teLinkBandwidthRowStatus
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."

-- componentLinkTable

OBJECT     componentLinkRowStatus
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."
-- componentLinkDescriptorTable

OBJECT componentLinkDescrRowStatus
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."

-- componentLinkBandwidthTable

OBJECT componentLinkBandwidthRowStatus
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."

::= { teLinkCompliances 1 }

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

MANDATORY-GROUPS { teLinkGroup,
telLinkBandwidthGroup,
componentLinkBandwidthGroup }

GROUP teLinkSrlgGroup
DESCRIPTION "This group is mandatory for GMPLS enabled devices."

GROUP teLinkPscGroup
DESCRIPTION "This group is mandatory for devices that support the packet switching capability."

GROUP teLinkTdmGroup
DESCRIPTION "This group is mandatory for devices that support the TDM switching capability."

-- teLinkTable
OBJECT           teLinkAddressType
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           teLinkLocalIpAddr
SYNTAX           InetAddress (SIZE(0|4|16))
MIN-ACCESS       read-only
DESCRIPTION      "Size of TE link IP address depends on type of TE link. TE 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           teLinkRemoteIpAddr
SYNTAX           InetAddress (SIZE(0|4|16))
MIN-ACCESS       read-only
DESCRIPTION      "Size of TE link IP address depends on type of TE link. TE 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           teLinkProtectionType
MIN-ACCESS       read-only
DESCRIPTION      "Write access is not required."

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

OBJECT           teLinkRowStatus
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           teLinkStorageType
MIN-ACCESS       read-only
DESCRIPTION      "Write access is not required."
-- teLinkDescriptorTable

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

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

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

OBJECT   teLinkDescrMaxLspBandwidthPrio0
MIN-ACCESS read-only
DESCRIPTION
 "Write access is not required."

OBJECT   teLinkDescrMaxLspBandwidthPrio1
MIN-ACCESS read-only
DESCRIPTION
 "Write access is not required."

OBJECT   teLinkDescrMaxLspBandwidthPrio2
MIN-ACCESS read-only
DESCRIPTION
 "Write access is not required."

OBJECT   teLinkDescrMaxLspBandwidthPrio3
MIN-ACCESS read-only
DESCRIPTION
 "Write access is not required."

OBJECT   teLinkDescrMaxLspBandwidthPrio4
MIN-ACCESS read-only
DESCRIPTION
 "Write access is not required."

OBJECT   teLinkDescrMaxLspBandwidthPrio5
MIN-ACCESS read-only
DESCRIPTION
 "Write access is not required."

OBJECT   teLinkDescrMaxLspBandwidthPrio6
MIN-ACCESS  read-only
DESCRIPTION  "Write access is not required."

OBJECT      teLinkDescrMaxLspBandwidthPrio7
MIN-ACCESS  read-only
DESCRIPTION  "Write access is not required."

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

-- teLinkSrlgTable

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

-- teLinkBandwidthTable

OBJECT      teLinkBandwidthRowStatus
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      teLinkBandwidthStorageType
MIN-ACCESS  read-only
DESCRIPTION  "Write access is not required."
RFC 4220  MPLS TE Link MIB Module  November 2005

-- componentLinkTable

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

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

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

-- componentLinkDescriptorTable

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

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

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

OBJECT  componentLinkDescrMaxLspBandwidthPrio0
MIN-ACCESS  read-only
DESCRIPTION
  "Write access is not required."

OBJECT  componentLinkDescrMaxLspBandwidthPrio1
MIN-ACCESS  read-only
DESCRIPTION
  "Write access is not required."
DESCRIPTION
"Write access is not required."

OBJECT componentLinkDescrMaxLspBandwidthPrio2
MIN-ACCESS read-only
DESCRIPTION
"Write access is not required."

OBJECT componentLinkDescrMaxLspBandwidthPrio3
MIN-ACCESS read-only
DESCRIPTION
"Write access is not required."

OBJECT componentLinkDescrMaxLspBandwidthPrio4
MIN-ACCESS read-only
DESCRIPTION
"Write access is not required."

OBJECT componentLinkDescrMaxLspBandwidthPrio5
MIN-ACCESS read-only
DESCRIPTION
"Write access is not required."

OBJECT componentLinkDescrMaxLspBandwidthPrio6
MIN-ACCESS read-only
DESCRIPTION
"Write access is not required."

OBJECT componentLinkDescrMaxLspBandwidthPrio7
MIN-ACCESS read-only
DESCRIPTION
"Write access is not required."

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

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

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

-- componentLinkBandwidthTable

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

::= { teLinkCompliances 2 }

-- Units of conformance

telLinkGroup OBJECT-GROUP
OBJECTS { telLinkAddressType,
telLinkLocalIpAddr,
telLinkRemoteIpAddr,
telLinkMetric,
telLinkProtectionType,
telLinkWorkingPriority,
telLinkResourceClass,
telLinkIncomingIfId,
telLinkOutgoingIfId,
telLinkRowStatus,
telLinkStorageType,
telLinkDescrSwitchingCapability,
telLinkDescrEncodingType,
telLinkDescrRowStatus,
telLinkDescrStorageType,
componentLinkPreferredProtection,
componentLinkCurrentProtection,
componentLinkRowStatus,
componentLinkStorageType,
componentLinkDescrSwitchingCapability,
componentLinkDescrEncodingType,
componentLinkDescrRowStatus,
componentLinkDescrStorageType
}

STATUS current
DESCRIPTION
"Collection of objects needed for the management of resources associated with TE links."
::= { teLinkGroups 1 }

teLinkSrlgGroup OBJECT-GROUP
OBJECTS { teLinkSrlgRowStatus,
          teLinkSrlgStorageType
        }

STATUS current
DESCRIPTION
"Collection of objects needed for the management of SRLG resources associated with TE links."
::= { teLinkGroups 2 }

teLinkBandwidthGroup OBJECT-GROUP
OBJECTS { teLinkMaximumReservableBandwidth,
          teLinkDescrMaxLspBandwidthPrio0,
          teLinkDescrMaxLspBandwidthPrio1,
          teLinkDescrMaxLspBandwidthPrio2,
          teLinkDescrMaxLspBandwidthPrio3,
          teLinkDescrMaxLspBandwidthPrio4,
          teLinkDescrMaxLspBandwidthPrio5,
          teLinkDescrMaxLspBandwidthPrio6,
          teLinkDescrMaxLspBandwidthPrio7,
          teLinkBandwidthUnreserved,
          teLinkBandwidthRowStatus,
          teLinkBandwidthStorageType
        }

STATUS current
DESCRIPTION
"Collection of objects needed for the management of the bandwidth resources associated with TE links and component links."
::= { teLinkGroups 3 }

componentLinkBandwidthGroup OBJECT-GROUP
OBJECTS { componentLinkMaxResBandwidth,
          componentLinkDescrMaxLspBandwidthPrio0,
          componentLinkDescrMaxLspBandwidthPrio1,
          componentLinkDescrMaxLspBandwidthPrio2,
          componentLinkDescrMaxLspBandwidthPrio3,
componentLinkDescrMaxLspBandwidthPrio4,
componentLinkDescrMaxLspBandwidthPrio5,
componentLinkDescrMaxLspBandwidthPrio6,
componentLinkDescrMaxLspBandwidthPrio7,
componentLinkBandwidthUnreserved,
componentLinkBandwidthRowStatus,
componentLinkBandwidthStorageType
}

STATUS  current
DESCRIPTION
"Collection of objects needed for the management of the
bandwidth parameters associated with component links."
 ::= { teLinkGroups 4 }

telinkPscGroup OBJECT-GROUP
OBJECTS { telinkDescrMinLspBandwidth,
telinkDescrInterfaceMtu,
componentLinkDescrMinLspBandwidth,
componentLinkDescrInterfaceMtu
}

STATUS  current
DESCRIPTION
"Collection of objects needed for devices that are
packet switch capable."
 ::= { telinkGroups 5 }

telinkTdmGroup OBJECT-GROUP
OBJECTS { telinkDescrMinLspBandwidth,
telinkDescrIndication,
componentLinkDescrMinLspBandwidth,
componentLinkDescrIndication
}

STATUS  current
DESCRIPTION
"Collection of objects needed for devices that are
TDM switching capable."
 ::= { telinkGroups 6 }

-- End of TE-LINK-STD-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:

- All the tables in this MIB module have routing information in them, so they all have the same security attributes. Unauthorized changes to attributes of these tables can disrupt resource allocation 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:

- IP address entries in the teLinkTable (teLinkLocalIpAddr and teLinkRemoteIpAddr) may reveal the internals of a network provider IP address space.

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

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13. IANA Considerations

The following "IANA Considerations" subsection requests IANA for a new assignment. New assignments can only be made via Standards Action as specified in [RFC2434].

13.1. IANA Considerations for the TE-LINK-STD-MIB

The TE-LINK-STD-MIB should be rooted under the transmission subtree. The IANA has assigned { transmission 200 } to the TE-LINK-STD-MIB module specified in this document.

14. References

14.1. Normative References

[IANAIfType] "IANAIfType MIB Module",
http://www.iana.org/assignments/ianaiftype-mib.


14.2. Informative References


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