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Traffic Engineering Link Management Information Base

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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 document.

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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

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

We present in this document 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 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](#), reference [[RFC2119](#)].

3. Terminology

This document uses terminology from the documents describing link bundling [[BUNDLING](#)] and G-MPLS [[GMPLS-ARCH](#)].

The link bundling feature is designed to aggregate one or more similar entities between a node pair into a bundled link [[BUNDLING](#)]. In the document, 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 just another kind of Traffic Engineering (TE) link (see [[GMPLS-OSPF](#)]). A link bundle is a subinterface which bounds 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 link 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 which 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 [[BUNDLING](#)].

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. More details on the use of the ifStackTable to establish relationship between bundled links, TE links and component links are given in [Section 8.2](#).

Suppose that one would like to manually create a bundled link

out of two 1:1 TE links as depicted on 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,
  teLinkIncomingIfId     = 0,
  teLinkOutgoingIfId     = 3,
  teLinkRowStatus        = createAndGo(4),
  teLinkStorageType      = nonVolatile(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)
}
```

```
In the teLinkSrlgTable:
```

```
{
  ifIndex                 = 4,
  teLinkSrlg              = 50,
  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

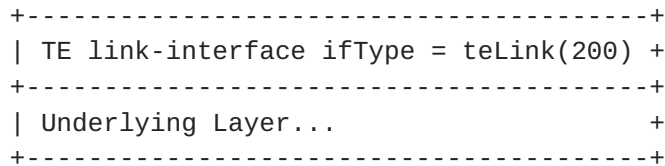
device according to LSP creation/deletion at different priorities. The values in the teLinkBandwidthTable are an aggregation of the values for the component links of the TE links and the TE links of the bundled link.

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 defined in [RFC2863].

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



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.

- Object Use for the TE Link layer
- ifIndex Each TE Link interface is represented by an ifEntry.
- ifDescr Description of the TE Link interface.
- 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 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 encoding type is clear. For other encoding types, traffic counters on a TE link are cumulative for all subinterfaces which it binds together.

8.2. Using ifStackTable

This section describes by example how to use 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. Examples given below are for illustration purposes only.

Example: MPLS is being carried on a bundled TE links.
 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:

ifIndex Description

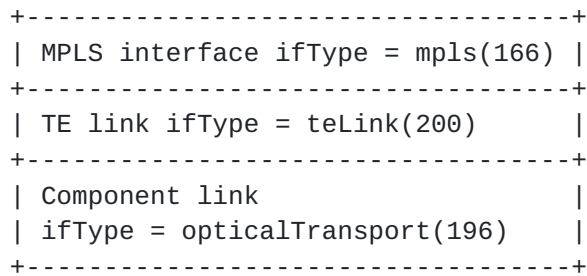
| | | |
|---|------------------|------------|
| 1 | mpls | (type 166) |
| 2 | teLink | (type 200) |
| 3 | teLink | (type 200) |
| 4 | teLink | (type 200) |
| 5 | opticalTransport | (type 196) |
| 6 | opticalTransport | (type 196) |

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

ifStackTable Entries

| HigherLayer | LowerLayer |
|-------------|------------|
| 0 | 1 |
| 1 | 2 |
| 2 | 3 |
| 2 | 4 |
| 3 | 5 |
| 4 | 6 |
| 5 | 0 |
| 6 | 0 |

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



The assignment of the index values could for example be:

| ifIndex | Description |
|---------|-----------------------------|
| 1 | mpls (type 166) |
| 2 | teLink (type 200) |
| 3 | opticalTransport (type 196) |

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

ifStackTable Entries

| HigherLayer | LowerLayer |
|-------------|------------|
|-------------|------------|

| | |
|---|---|
| 0 | 1 |
| 1 | 2 |
| 2 | 3 |
| 3 | 0 |

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;
```

```
teLinkStdMIB MODULE-IDENTITY
```

```
LAST-UPDATED "200405141200Z" -- 14 May 2004 12:00:00 EST
```

```
ORGANIZATION "Multiprotocol Label Switching (MPLS) Working Group"
```

```
CONTACT-INFO
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```
      Jonathan P. Lang
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```


Comments about this document should be emailed directly to the MPLS working group mailing list at mpls@uu.net."

DESCRIPTION

"Copyright (C) 2004 The Internet Society. This version of this MIB module is part of RFC XXXX; 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'."

-- Revision history.

REVISION

"200405141200Z" -- 14 May 2004 12:00:00 EST

DESCRIPTION

"Initial version published as RFC xxxx (to be assigned by RFC Editor)"

::= { transmission xxx } -- To be assigned by IANA.
-- Request to assign 200 which is
-- ifType value for teLink.

-- 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. 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."

SYNTAX Unsigned32 (0..7)

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 MPLS' 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 '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 MPLS, RFC xxxx"
-- RFC Editor to fill in RFC number that will be assigned to
-- [[GMPLS-OSPF](#)]

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

-- Top level components of this MIB module

-- Notifications

```
teLinkNotifications OBJECT IDENTIFIER ::= { teLinkStdMIB 0 }
```

-- Tables, Scalars

```
teLinkObjects      OBJECT IDENTIFIER ::= { teLinkStdMIB 1 }
```

-- Conformance

```
teLinkConformance OBJECT IDENTIFIER ::= { teLinkStdMIB 2 }
```

-- TE Link Table

teLinkTable OBJECT-TYPE

```
SYNTAX      SEQUENCE OF TeLinkEntry
```

```
MAX-ACCESS  not-accessible
```

```
STATUS      current
```

DESCRIPTION

"This table specifies the grouping of component links into TE links and grouping of TE links into bundled links."

```
::= { teLinkObjects 1 }
```

teLinkEntry OBJECT-TYPE

```
SYNTAX      TeLinkEntry
```

```
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 teLinkEntry is created with the corresponding ifIndex. If a TE link entry in the ifTable is destroyed, then so is the corresponding entry in the teLinkTable. 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 and 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 and 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, RFC xxxx"

-- RFC Editor to fill in RFC number that will be assigned to

-- [\[BUNDLING\]](#)

```
::= { 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 MPLS, RFC xxxx"


```
-- RFC Editor to fill in RFC number that will be assigned to
-- [GMPLS-OSPF]
 ::= { 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 link protection type of the TE link. Description of the different protection types can be found in the 'Routing Extensions in Support of Generalized MPLS' document."

REFERENCE

"OSPF Extensions in Support of Generalized MPLS, RFC xxxx and Routing Extensions in Support of Generalized MPLS, RFC xxxx"
-- RFC Editor to fill in RFC number that will be assigned to
-- [GMPLS-OSPF] and [ROUTING]

```
 ::= { 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 MPLS, RFC xxxx"
-- RFC Editor to fill in RFC number that will be assigned to
-- [GMPLS-OSPF]

```
 ::= { 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 Extensions to OSPF Version 2' document."

REFERENCE

"Link Bundling in MPLS Traffic Engineering, RFC xxxx and Traffic Engineering (TE) Extensions to OSPF Version 2, [RFC 3630](#)"

-- RFC Editor to fill in RFC number that will be assigned to
-- [[BUNDLING](#)]

::= { 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, RFC xxxx"

-- RFC Editor to fill in RFC number that will be assigned to
-- [[BUNDLING](#)]

::= { 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, RFC xxxx"

-- RFC Editor to fill in RFC number that will be assigned to
-- [[BUNDLING](#)]

::= { 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
    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 MPLS, RFC xxxx"
        -- RFC Editor to fill in RFC number that will be assigned to
        -- [GMPLS-OSPF]
    ::= { teLinkDescriptorEntry 2 }
```

```
teLinkDescrEncodingType OBJECT-TYPE
    SYNTAX      TeLinkEncodingType
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "This attribute specifies the TE link encoding type."
    REFERENCE
        "Generalized MPLS 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 MPLS, RFC xxxx"

-- RFC Editor to fill in RFC number that will be assigned to

-- [\[GMPLS-OSPF\]](#)

```
::= { 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 MPLS, RFC xxxx"

-- RFC Editor to fill in RFC number that will be assigned to

-- [\[GMPLS-OSPF\]](#)

```
::= { 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 MPLS, RFC xxxx"

-- RFC Editor to fill in RFC number that will be assigned to


```
-- [GMPLS-OSPF]
 ::= { 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 MPLS, RFC xxxx"
-- RFC Editor to fill in RFC number that will be assigned to
-- [GMPLS-OSPF]

```
 ::= { 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 MPLS, RFC xxxx"
-- RFC Editor to fill in RFC number that will be assigned to
-- [GMPLS-OSPF]

```
 ::= { 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 MPLS, RFC xxxx"
-- RFC Editor to fill in RFC number that will be assigned to


```
-- [GMPLS-OSPF]
 ::= { 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 MPLS, RFC xxxx"
-- RFC Editor to fill in RFC number that will be assigned to
-- [GMPLS-OSPF]

```
 ::= { 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 MPLS, RFC xxxx"
-- RFC Editor to fill in RFC number that will be assigned to
-- [GMPLS-OSPF]

```
 ::= { 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 MPLS, RFC xxxx"
-- RFC Editor to fill in RFC number that will be assigned to


```
-- [GMPLS-OSPF]
 ::= { 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 MPLS, RFC xxxx"
-- RFC Editor to fill in RFC number that will be assigned to
-- [GMPLS-OSPF]
```

```
 ::= { 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 MPLS, RFC xxxx"
-- RFC Editor to fill in RFC number that will be assigned to
-- [GMPLS-OSPF]
```

```
 ::= { 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 changed if teLinkDescrRowStatus is in 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
```

```
STATUS current
```

```
DESCRIPTION
```

```
"An entry in this table contains information about a  
SRLG associated with a TE link.
```

```
An ifEntry in the ifTable must exist before a  
teLinkSrlgEntry 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  
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 a 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 MPLS, RFC xxxx"
```

```
-- RFC Editor to fill in RFC number that will be assigned to
```



```
-- [GMPLS-OSPF]  
 ::= { 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. ifType of ifEntry must be teLink(200).  
If a TE link entry in the ifTable is destroyed, then so are
```


all 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
}
```

teLinkBandwidthPriority 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 Extensions to OSPF Version 2' document."

REFERENCE

"OSPF Extensions in Support of Generalized MPLS, RFC xxxx and Traffic Engineering (TE) Extensions to OSPF Version 2, [RFC 3630](#)"

-- RFC Editor to fill in RFC number that will be assigned to
-- [\[GMPLS-OSPF\]](#)

```
::= { 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 (excludes all links that are strictly used as protecting links)."

REFERENCE

"Link Bundling in MPLS Traffic Engineering, RFC xxxx"

-- RFC Editor to fill in RFC number that will be assigned to
-- [\[BUNDLING\]](#)

```
::= { 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 which 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 MPLS, RFC xxxx"
        -- RFC Editor to fill in RFC number that will be assigned to
        -- [GMPLS-OSPF]
    ::= { componentLinkEntry 1 }

componentLinkPreferredProtection OBJECT-TYPE
    SYNTAX      TeLinkProtection
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "This attribute specifies whether this component link is
         a primary or secondary entity."
    ::= { componentLinkEntry 2 }

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 }

componentLinkRowStatus 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 componentLinkRowStatus is active(1)."
```



```
::= { componentLinkEntry 4 }
```

```
componentLinkStorageType OBJECT-TYPE
```

```
SYNTAX          StorageType
```

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

```
STATUS          current
```

```
DESCRIPTION
```

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

```
::= { componentLinkEntry 5 }
```

```
-- End of componentLinkTable
```

```
-- Component Link Descriptor Table
```

```
componentLinkDescriptorTable OBJECT-TYPE
```

```
SYNTAX          SEQUENCE OF ComponentLinkDescriptorEntry
```

```
MAX-ACCESS      not-accessible
```

```
STATUS          current
```

```
DESCRIPTION
```

```
"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 which 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,
componentLinkDescrIndication            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 MPLS, RFC xxxx"
    -- RFC Editor to fill in RFC number that will be assigned to
    -- [GMPLS-OSPF]
 ::= { componentLinkDescriptorEntry 2 }

```

componentLinkDescrEncodingType OBJECT-TYPE

```

SYNTAX      TeLinkEncodingType
MAX-ACCESS  read-create
STATUS      current
DESCRIPTION
    "This attribute specifies the component link encoding type."
REFERENCE
    "Generalized MPLS 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 MPLS, RFC xxxx"
              -- RFC Editor to fill in RFC number that will be assigned to
              -- [GMPLS-OSPF]
 ::= { 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 MPLS, RFC xxxx"
              -- RFC Editor to fill in RFC number that will be assigned to
              -- [GMPLS-OSPF]
 ::= { 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 MPLS, RFC xxxx"
              -- RFC Editor to fill in RFC number that will be assigned to
              -- [GMPLS-OSPF]
 ::= { 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 MPLS, RFC xxxx"
-- RFC Editor to fill in RFC number that will be assigned to
-- [[GMPLS-OSPF](#)]

::= { 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 MPLS, RFC xxxx"
-- RFC Editor to fill in RFC number that will be assigned to
-- [[GMPLS-OSPF](#)]

::= { 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

"OSPF Extensions in Support of Generalized MPLS, RFC xxxx"
-- RFC Editor to fill in RFC number that will be assigned to
-- [[GMPLS-OSPF](#)]

::= { componentLinkDescriptorEntry 9 }

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 MPLS, RFC xxxx"
-- RFC Editor to fill in RFC number that will be assigned to
-- [[GMPLS-OSPF](#)]

::= { componentLinkDescriptorEntry 10 }

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 MPLS, RFC xxxx"

-- RFC Editor to fill in RFC number that will be assigned to

-- [\[GMPLS-OSPF\]](#)

::= { componentLinkDescriptorEntry 11 }

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 MPLS, RFC xxxx"

-- RFC Editor to fill in RFC number that will be assigned to

-- [\[GMPLS-OSPF\]](#)

::= { componentLinkDescriptorEntry 12 }

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 MPLS, RFC xxxx"

-- RFC Editor to fill in RFC number that will be assigned to

-- [\[GMPLS-OSPF\]](#)

::= { componentLinkDescriptorEntry 13 }

componentLinkDescrIndication 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 MPLS, RFC xxxx"
-- RFC Editor to fill in RFC number that will be assigned to
-- [[GMPLS-OSPF](#)]

::= { 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
MAX-ACCESS not-accessible
STATUS current

DESCRIPTION

"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. ifEntry's ifType can be of any interface type which 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 Extensions to OSPF Version 2' document."

REFERENCE

"OSPF Extensions in Support of Generalized MPLS, RFC xxxx and Traffic Engineering (TE) Extensions to OSPF Version 2, [RFC 3630](#)"

-- RFC Editor to fill in RFC number that will be assigned to
-- [\[GMPLS-OSPF\]](#)

```
::= { 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 MPLS, RFC xxxx"
-- RFC Editor to fill in RFC number that will be assigned to
-- [\[GMPLS-OSPF\]](#)

```
::= { 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

teLinkCompliances

OBJECT IDENTIFIER ::= { teLinkConformance 1 }

teLinkGroups

OBJECT IDENTIFIER ::= { teLinkConformance 2 }

teLinkModuleFullCompliance 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 G-MPLS enabled devices."

GROUP teLinkPscGroup

DESCRIPTION

"This group is mandatory for devices that support packet switching capability."

GROUP teLinkTdmGroup

DESCRIPTION

"This group is mandatory for devices that support 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 link is unnumbered, four if link IP address is IPv4 and sixteen if 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 link is unnumbered, four if link IP address is IPv4 and sixteen if 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 }
```

```
teLinkModuleReadOnlyCompliance MODULE-COMPLIANCE
```

```
STATUS current
```

DESCRIPTION

"Compliance statement for agents that support the monitoring of TE link MIB module."

```
MODULE -- this module
```

```
MANDATORY-GROUPS { teLinkGroup,
                    teLinkBandwidthGroup,
                    componentLinkBandwidthGroup }
```

```
GROUP teLinkSrlgGroup
```

DESCRIPTION

"This group is mandatory for G-MPLS enabled devices."

```
GROUP teLinkPscGroup
```

DESCRIPTION

"This group is mandatory for devices that support packet switching capability."

```
GROUP teLinkTdmGroup
```

DESCRIPTION

"This group is mandatory for devices that support 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 link is unnumbered,
four if link IP address is IPv4 and sixteen if 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 link is unnumbered,
four if link IP address is IPv4 and sixteen if 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."

-- 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."

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

teLinkGroup OBJECT-GROUP

OBJECTS { teLinkAddressType,
teLinkLocalIpAddr,
teLinkRemoteIpAddr,
teLinkMetric,
teLinkProtectionType,
teLinkWorkingPriority,
teLinkResourceClass,
teLinkIncomingIfId,
teLinkOutgoingIfId,
teLinkRowStatus,
teLinkStorageType,
teLinkDescrSwitchingCapability,
teLinkDescrEncodingType,
teLinkDescrRowStatus,
teLinkDescrStorageType,
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. Intellectual Property Considerations

The IETF takes no position regarding the validity or scope of any intellectual property or other rights that might be claimed to pertain to the implementation or use of the technology described in this document or the extent to which any license under such rights might or might not be available; neither does it represent that it has made any effort to identify any such rights. Information on the IETF's procedures with respect to rights in standards-track and standards-related documentation can be found in [BCP-11](#). Copies of claims of rights made available for publication and any assurances of licenses to be made available, or the result of an attempt made to obtain a general license or permission for the use of such proprietary rights by implementers or users of this specification can be obtained from the IETF Secretariat.

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this standard. Please address the information to the IETF Executive Director.

By submitting this Internet Draft, we certify that any applicable patent or other IPR claims of which we are aware have been disclosed, and any of which we become aware will be disclosed, in accordance with [RFC 3668](#).

11. 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 and 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 (teLinkLocalIpAddress and teLinkRemoteIpAddress) 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.

12. Acknowledgments

The authors would like to acknowledge the contribution of Dmitry Ryumkin.

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 TE-LINK-STD-MIB

TE-LINK-STD-MIB should be rooted under the transmission subtree. The IANA is requested to assign { transmission TBD } to the TE-LINK-STD-MIB module specified in this document. The IANA is requested to use same number as the telink ifType.

14. References

14.1. Normative References

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