

Internet Engineering Task Force
Internet-Draft
Intended status: Standards Track
Expires: January 15, 2014

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July 14, 2013

**A SNMP MIB to manage GMPLS with General Constraints support
draft-gmgm-ccamp-gencons-snmp-mib-02**

Abstract

This memo defines a portion of the Management Information Base (MIB) used by Simple Network Management Protocol (SNMP) for GMPLS based networks.

In particular in the context Wavelength Switching Optical Network (WSON) two sets of information were defined: a general constraints set (reusable by other technologies) and a WSON specific set. This document defines a MIB module for supporting general constrain information.

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[1.](#) Introduction

This memo defines a portion of the Management Information Base (MIB) used by Simple Network Management Protocol (SNMP) in GMPLS networks in particular for Wavelength Switched Optical Networks (WSO) as defined in [\[RFC6163\]](#).

Those extensions were divided in two parts: generic constrains (as they can be easily applied to other technologies) and WSON specific constraints. This document aim to defines MIBs extentions to conver

only the generic constrain part. The WSON specific MIB extensions will be covered by a separate document [\[I-D.gmngm-ccamp-wson-snmp-mib\]](#).

As such, document [\[I-D.ietf-ccamp-general-constraint-encode\]](#) defines specific TLVs while [\[RFC6825\]](#) implement OSPF-TE related extensions. This MIB document aim to cover information defined in those general constrain drafts.

[EDITOR NOTE] Very early draft to start MIB activity on GMPLS-WSON related extensions and collect feedback from working group.

2. 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](#) [\[RFC2580\]](#).

3. Conventions

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](#) [\[RFC2119\]](#). In the description of OIDs the convention: Set (S) Get (G) and Trap (T) conventions will describe the action allowed by the parameter.

4. Overview

Regarding existing GMPLS MIBs modules, since the TED module [\[RFC6825\]](#) already provide an extension to previous GMPLS modules, we provide here a direct extension to it. Additional GMPLS MIB modules this document uses are [\[RFC4802\]](#) and [\[RFC4803\]](#).

Current GMPLS MIBs are covered by several documents. The most important to reference here are the [\[RFC4802\]](#) and [\[RFC4803\]](#). Most recent works on GMPLS MIBs is in [\[RFC6825\]](#), whenever possible this document will reuse the same approach.

General constraints can be classified in two broad categories: link information (as other GMPLS TED information) and Node information (this is different from what currently available). For link information the most similar definitions are the ones from [\[RFC4803\]](#) where the label table is defined. For node information however, new specific information has to be defined.

5. Structure of the MIB Module

Modules defined here provide additional information to existing GMPLS MIBs in order to represent the general constraints information as reported in [\[I-D.ietf-ccamp-general-constraint-encode\]](#). This module is organized into two tables as reported in the following sub sections.

5.1. gmplsGenConsAvailableLabelsTable

This object represents the Labels availability as defined by [\[I-D.ietf-ccamp-general-constraint-encode\]](#) [section 2.3](#). This information may be introduced by specific technologies but is represented in a general form. An application example is [\[draft-ietf-ccamp-wson-signal-compatibility-ospf\]](#) that advertises such information under its specific ISC values.

The table entry is composed by:

- o gmplsGenConsLabelIndex (type: Unsigned 32)
- o gmplsGenConsLabelInterface (type: typesInterfaceIndexOrZero)
- o gmplsGenConsISCD (type: IANA Gmpls Switching Type TC needs to be properly extended).
[EDITOR NOTE1: could we assume that ISCD=151 for WSON hence the associated label follows [RFC6205](#). Likely flexgrid will have the same constraint.]
[EDITOR NOTE2: we could probably add an index reference to the tedSwCapTable so we have all switching capability info through one pointer.]
- o gmplsGenConsLabelValue (type: a value that might be greater than 32 bits, not sure about max length). Value format may vary upon the ISCD however the generic label format defined in the past still applies. A type might be reused could be (gmplsLabelPortWavelength Unsigned32) defined in GMPLS LSR MIB. However we need to support labels bigger than 32 bits.

Depending on switching capability available on an interface, this table MUST be initialized with all possible available labels values. As

long as tunnels are created and labels are used, the existing `gmplsLabelTable` defined in [\[RFC4803\]](#), is filled up while entries are removed from this `gmplsGenConsAvailableLabelsTable`.

5.2. `gmplsGenConsSharedBackupLabelsTable`

The purpose of shared backup labels is defined in [\[I-D.ietf-ccamp-general-constraint-encode\]](#). As in the previous case the information is advertised through the specific ISCD.

The entry for this table is equal to definitions in [Section 5.1](#) hence we have the same table format.

5.3. `gmplsGenConsConnMatrixTable`

The Connectivity Matrix indicates the Node constraints introduced by [\[I-D.ietf-ccamp-general-constraint-encode\]](#) as additional constraints compared to link/label constraints.

The table entry shall have the following information:

- o An identifier of the local node. E.g. `tedLocalRouterId` (type: `TedRouterIdTC`).
- o Connectivity Matrix Type (1: RWA, 2: Optical Impairments)
- o Connectivity Matrix ID: the unique identifier for the current connectivity matrix. Type: integer.
- o Link Ingress: (Type: `TedLinkIndexTC`) the link identifier for the ingress link (ingress and egress link identify a possible connectivity for the node).
- o Link Egress: (Type: `TedLinkIndexTC`) the link identifier for the egress link (ingress and egress link identify a possible connectivity for the node).

5.4. `gmplsGenConsPortLabelRestrictionTable`

This table the port label constraints introduced by [\[I-D.ietf-ccamp-general-constraint-encode\]](#) as an additional constraints on the port or vs permitted labels. This constraints related to the connectivity matrix (from previous section) and are advertised through [\[I-D.ietf-ccamp-gmpls-general-constraints-ospf-te\]](#).

The entry for this table has the following elements:

- o An identifier for the local node. E.g. tedLocalRouterId (type: TedRouterIdTC).
- o Connectivity matrix id: an index in the previous table
- o Restriction Type (Values: 0 Simple Label, 1 Channel Count, 2 Label Range1, 3 Simple Label and Channel Count, 4 Link Label Exclusivity)
- o Label Set: used depending on restriction type
- o Max Channel Count / Max Label Set (Integer): used depending on restriction type
- o Link Set: used depending on restrictio type

6. Relationship to Other MIB Modules

6.1. Relationship to the [TEMPLATE TODO] MIB

6.2. MIB modules required for IMPORTS

7. Definitions

TED-GENCONS-MIB DEFINITIONS ::= BEGIN

IMPORTS

MODULE-IDENTITY, OBJECT-TYPE, TimeTicks, NOTIFICATION-TYPE,
Unsigned32, Counter32, Integer32
FROM SNMPv2-SMI
DateAndTime, TEXTUAL-CONVENTION, RowStatus, TruthValue
FROM SNMPv2-TC
IANAGmplsSwitchingTypeTC
FROM IANA-GMPLS-TC-MIB
GmplsFreeformLabelTC
FROM GMPLS-TC-STD-MIB
ifIndex, ifDescr
FROM IF-MIB;

tedGenConsGMPLSMibModule MODULE-IDENTITY

LAST-UPDATED

"201307070000Z"

-- Thu Jul 7 10:00:00 PST 2013

ORGANIZATION

" IETF Common Control And Measurement Plane (CCAMP) Working
Group "

CONTACT-INFO

"WG charter:

<http://www.ietf.org/html.charters/>

Mailing Lists:

Editor: Gabriele Galimberti

Email: ggalimbe@cisco.com"

DESCRIPTION

"This MIB module defines objects used for managing the the generic constraints for switched networks in GMPLS networks ."

REVISION "201201270000Z"

DESCRIPTION

"Draft version 1.0"

::= { tedGenConsGMPLSMibRoot 1 }

--

-- Textual Conventions

--

TedGenConsInterfaceIndexOrZero ::= TEXTUAL-CONVENTION

STATUS current

DESCRIPTION "interface index from 0 ..2147483647"

SYNTAX INTEGER (0..2147483647)

tedGenConsGmpls OBJECT IDENTIFIER ::= { tedGenConsGMPLSMibModule 1 }

gmplsGenConsAvailableLabelsTable OBJECT-TYPE

SYNTAX SEQUENCE OF GmplsGenConsAvailableLabelsEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"Information about the shared backup Labels availability as defined by

[\[I-D.ietf-ccamp-general-constraint-encode\]](#)

[section 2.3.](#) "

::= { tedGenConsGmpls 1 }

gmplsGenConsAvailableLabelsEntry OBJECT-TYPE

SYNTAX GmplsGenConsAvailableLabelsEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"A conceptual row availability labels Table."

INDEX { gmplsGenConsLabelIndex }

::= { gmplsGenConsAvailableLabelsTable 1 }

GmplsGenConsAvailableLabelsEntry ::=

SEQUENCE {

gmplsGenConsLabelIndex


```
        Unsigned32,
gmplsGenConsLabelInterface
        TedGenConsInterfaceIndexOrZero,
gmplsGenConsISCD
        IANAGmplsSwitchingTypeTC,
gmplsGenConsLabelValue
        Unsigned32
}
```

gmplsGenConsLabelIndex OBJECT-TYPE

```
SYNTAX      Unsigned32
MAX-ACCESS  not-accessible
STATUS      current
DESCRIPTION
    " Label Index for this table"
 ::= { gmplsGenConsAvailableLabelsEntry 1 }
```

gmplsGenConsLabelInterface OBJECT-TYPE

```
SYNTAX      TedGenConsInterfaceIndexOrZero
MAX-ACCESS  read-write
STATUS      current
DESCRIPTION
    "The interface Index of this interface"
 ::= { gmplsGenConsAvailableLabelsEntry 2 }
```

gmplsGenConsISCD OBJECT-TYPE

```
SYNTAX      IANAGmplsSwitchingTypeTC
MAX-ACCESS  read-write
STATUS      current
DESCRIPTION
    "The interface switching type as defined in rfc4802.
    The type needs to be extended for eg flex grid"
 ::= { gmplsGenConsAvailableLabelsEntry 3 }
```

gmplsGenConsLabelValue OBJECT-TYPE

```
SYNTAX      Unsigned32
MAX-ACCESS  read-write
STATUS      current
DESCRIPTION
    "The Label value."
 ::= { gmplsGenConsAvailableLabelsEntry 4 }
```

--
--

-- This purpose of the shared backup tabble is defined by
-- [\[I-D.ietf-ccamp-general-constraint-encode\]](#).
-- As if the available table the information is advertised through


```
-- the specific ISCD
--
gmplsGenConsSharedBackupLabelsTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF GmplsGenConsSharedBackupLabelsEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "Information about the shared backup Labels
        availability as defined by
        [I-D.ietf-ccamp-general-constraint-encode]
        section 2.3. "
    ::= { tedGenConsGmpls 2 }

gmplsGenConsSharedBackupLabelsEntry OBJECT-TYPE
    SYNTAX      GmplsGenConsSharedBackupLabelsEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "A conceptual row  availability labels Table."
    INDEX       { gmplsGenConsBackupLabelIndex }
    ::= { gmplsGenConsSharedBackupLabelsTable 1 }

GmplsGenConsSharedBackupLabelsEntry ::=
    SEQUENCE {
        gmplsGenConsBackupLabelIndex
            Unsigned32,
        gmplsGenConsBackupLabelInterface
            TedGenConsInterfaceIndexOrZero,
        gmplsGenConsBackupISCD
            IANAGmplsSwitchingTypeTC,
        gmplsGenConsBackupLabelValue
            Unsigned32
    }

gmplsGenConsBackupLabelIndex OBJECT-TYPE
    SYNTAX      Unsigned32
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        " Label Index for this table"
    ::= { gmplsGenConsSharedBackupLabelsEntry 1 }

gmplsGenConsBackupLabelInterface OBJECT-TYPE
    SYNTAX      TedGenConsInterfaceIndexOrZero
    MAX-ACCESS  read-write
    STATUS      current
    DESCRIPTION
```



```
        "The interface Index of this interface"
 ::= { gmplsGenConsSharedBackupLabelsEntry 2 }

gmplsGenConsBackupISCD OBJECT-TYPE
    SYNTAX      IANAGmplsSwitchingTypeTC
    MAX-ACCESS   read-write
    STATUS       current
    DESCRIPTION
        "The interface switching type as defined in rfc4802.
         The type needs to be extended for eg flex grid"
 ::= { gmplsGenConsSharedBackupLabelsEntry 3 }

gmplsGenConsBackupLabelValue OBJECT-TYPE
    SYNTAX      Unsigned32
    MAX-ACCESS   read-write
    STATUS       current
    DESCRIPTION
        "The Label value."
 ::= { gmplsGenConsSharedBackupLabelsEntry 4 }

--
-- gmplsGenConsPortNodeTable
-- This table indicates the Node constraints introduced by
-- [I-D.ietf-ccamp-general-constraint-encode] as additional
-- constraints compared to link/label constraints reported above

gmplsGenConsiPortNodeTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF GmplsGeniPortConsNodeEntry
    MAX-ACCESS   not-accessible
    STATUS       current
    DESCRIPTION
        "Information about the Port-label Node constraints."
 ::= { tedGenConsGmpls 3 }

gmplsGenConsPortNodeEntry OBJECT-TYPE
    SYNTAX      GmplsGenConsPortNodeEntry
    MAX-ACCESS   not-accessible
    STATUS       current
    DESCRIPTION
        "A conceptual row in the Node Table."
    INDEX       { gmplsGenConsPortNodeIndex }
 ::= { gmplsGenConsPortNodeTable 1 }

GmplsGenConsPortNodeEntry ::=
    SEQUENCE {
        gmplsGenConsPortNodeIndex
            Unsigned32,
```



```

        gmplsGenConsPortLabelRestriction
            Unsigned32
    }

    gmplsGenConsPortNodeIndex OBJECT-TYPE
        SYNTAX      Unsigned32
        MAX-ACCESS   not-accessible
        STATUS       current
        DESCRIPTION
            " Port node restristion Index for this table"
        ::= { gmplsGenConsPortNodeEntry 1 }

    gmplsGenConsBackupLabelInterface OBJECT-TYPE
        SYNTAX      Unsigned32
        MAX-ACCESS   read-write
        STATUS       current
        DESCRIPTION
            "This information represent a constain on ports vs
            labels (i.e. some ports may not support all
            wavelenghts)."
        ::= { gmplsGenConsPortNodeEntry 2 }

-- gmplsGenConsConnectvityNodeTable
-- This table indicates the Node's connectivity matrix
-- ie some internal constraints in terms of connectivity
    gmplsGenConsiConnectvityNodeTable OBJECT-TYPE
        SYNTAX      SEQUENCE OF GmplsGeniConnectvityConsNodeEntry
        MAX-ACCESS   not-accessible
        STATUS       current
        DESCRIPTION
            "Information about the constraints in terms of
            connectivity for the node. "
        ::= { tedGenConsGmpls 4 }

    gmplsGenConsConnectvityNodeEntry OBJECT-TYPE
        SYNTAX      GmplsGenConsConnectvityNodeEntry
        MAX-ACCESS   not-accessible
        STATUS       current
        DESCRIPTION
            "A conceptual row in the Connectvity Node Table."
        INDEX       { gmplsGenConsConnectvityNodeIndex }
        ::= { gmplsGenConsPortConnectvityTable 1 }

    GmplsGenConsConnectvityNodeEntry ::=
        SEQUENCE {
            gmplsGenConsConnectvityNodeIndex
                Unsigned32,

```



```
        gmplsGenConsConnectvityMatrix
            Unsigned32
    }

    gmplsGenConsConnectvityNodeIndex OBJECT-TYPE
        SYNTAX             Unsigned32
        MAX-ACCESS          not-accessible
        STATUS              current
        DESCRIPTION
            " Connectivity matrix node Index for this table"
        ::= { gmplsGenConsConnectvityNodeEntry 1 }

    gmplsGenConsConnectvityMatrix OBJECT-TYPE
        SYNTAX             Unsigned32
        MAX-ACCESS          read-write
        STATUS              current
        DESCRIPTION
            "This information represent some node internal
            constraint in term of connectivity."
        ::= { gmplsGenConsConnectvityNodeEntry 2 }

END
```

8. 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:

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.

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.

9. IANA Considerations

Option #1:

The MIB module in this document uses the following IANA-assigned OBJECT IDENTIFIER values recorded in the SMI Numbers registry:

Descriptor	OBJECT IDENTIFIER value
-----	-----
sampleMIB	{ mib-2 XXX }

Option #2:

Editor's Note (to be removed prior to publication): the IANA is requested to assign a value for "XXX" under the 'mib-2' subtree and to record the assignment in the SMI Numbers registry. When the assignment has been made, the RFC Editor is asked to replace "XXX" (here and in the MIB module) with the assigned value and to remove this note.

Note well: prior to official assignment by the IANA, an internet draft MUST use placeholders (such as "XXX" above) rather than actual numbers. See [RFC4181 Section 4.5](#) for an example of how this is done in an internet draft MIB module.

Option #3:

This memo includes no request to IANA.

10. Contributors

to be added.

11. References

11.1. Normative References

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11.2. Informative References

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- [I-D.gmngm-ccamp-wson-snmp-mib]
Galimberti, G., Martinelli, G., Hiremagalur, D., and G. Grammel, "A SNMP MIB to manage GMPLS TED with WSON specific support", [draft-gmngm-ccamp-wson-snmp-mib-00](#) (work in progress), July 2012.

[Appendix A.](#) Change Log

This optional section should be removed before the internet draft is submitted to the IESG for publication as an RFC.

Note to RFC Editor: please remove this appendix before publication as an RFC.

[Appendix B.](#) Open Issues

Note to RFC Editor: please remove this appendix before publication as an RFC.

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