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**Label Switched Path (LSP) Provisioning Performance Management  
Information Base for Generalized MPLS (GMPLS) / MPLS-TE networks  
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**Abstract**

This memo defines Management Information Bases (MIBs) for performances of provisioning Label Switched Paths (LSPs) in Generalized MPLS or MPLS-TE networks.

When Generalized MPLS/MPLS-TE is used to provision LSPs, it is useful to record the performance of the provisioning process, such as the delay in creating and deleting the LSPs. The managed information may be retrieved by the Management System and visualized on the GUI, so that the performance of dynamic provisioning may be monitored in a timely manner.

This work is a continuation of the work in [[RFC5814](#)] and [[I-D.ietf-ccamp-dpm](#)], where the provisioning performance values are obtained through active measurements.

**Status of this Memo**

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## Table of Contents

<a href="#">1.</a>	Introduction . . . . .	<a href="#">4</a>
<a href="#">2.</a>	Conventions Used in This Document . . . . .	<a href="#">5</a>
<a href="#">3.</a>	The Internet-Standard Management Framework . . . . .	<a href="#">6</a>
<a href="#">4.</a>	Brief Description of LSP performance MIB Objects . . . . .	<a href="#">7</a>
<a href="#">4.1.</a>	gmplsPerfMaxEntries . . . . .	<a href="#">7</a>
<a href="#">4.2.</a>	gmplsPerfTunnelConfigured . . . . .	<a href="#">7</a>
<a href="#">4.3.</a>	gmplsPerfTable . . . . .	<a href="#">7</a>
<a href="#">5.</a>	GMPLS Performance MIB Module . . . . .	<a href="#">8</a>
<a href="#">6.</a>	References . . . . .	<a href="#">15</a>
<a href="#">6.1.</a>	Normative References . . . . .	<a href="#">15</a>
<a href="#">6.2.</a>	Informative References . . . . .	<a href="#">15</a>
	Authors' Addresses . . . . .	<a href="#">16</a>



## **1. Introduction**

When Label Switched Paths (LSPs) are provisioned dynamically within an operational network, it is helpful to monitor and record the related performance information, such as the experienced provisioning delay and error events. Such information may help operators to ensure correct operation of dynamic LSP provisioning in their network, or possibly identify performance degradation in the control plane.

This memo defines a set of objects that can reveal the performance of an operational network in terms of dynamic LSP provisioning. It is intended to complement the performance objects, such as the number of packets received and sent, per LSP tunnel, in [[RFC3812](#)] and [[RFC4802](#)].

Unlike the work in [[RFC5814](#)] and [[I-D.ietf-ccamp-dpm](#)], where the performance values are obtained through active measurements, this document focuses on the performance values in operational environments. The actual value of the performance in this document is recorded only when an LSP is provisioned, and is thus collected passively. Hence such information reflects only the performance at specific and discrete times. However, when properly used, they can be helpful in identifying performance degradation, or even malfunctioning, in the network control plane.



## **2. Conventions Used in This Document**

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 [[RFC2119](#)].



### **3. 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 \[RFC3410\]](#).

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].



#### **4. Brief Description of LSP performance MIB Objects**

##### **4.1. gmplsPerfMaxEntries**

Defines the maximum number of rows stored in the gmplsPerfTable. An implementation MUST start assigning gmplsPerfEntryIndex values at 1 and wrap after exceeding the maximum possible value, as defined by the limit of this object.

##### **4.2. gmplsPerfTunnelConfigured**

Defines the The total number of tunnels configured.

##### **4.3. gmplsPerfTable**

The performance of past LSP provisioning process is stored in this table. To handle possible provisioning failures, start and complete timestamp of a provisioning operation is recorded. For example, for LSP creation process, the timestamps of creation initiation and completion are recorded seperatly. It is up to the users to determine the actual performance value, or identify a possible creation/deletion failure. The maximum number of entries stored in this table is determined by the value of gmplsPerfMaxEntries.



## 5. GMPLS Performance MIB Module

```
GMPLS-PROV-PERF-STD-MIB DEFINITIONS ::= BEGIN
```

```
IMPORTS
```

```
    gmplsTeStdMIB
        FROM GMPLS-TE-STD-MIB
    mplsStdMIB,
    MplsTunnelIndex,
    MplsExtendedTunnelId
        FROM MPLS-TC-STD-MIB          -- RFC 3811
    TimeStamp
        FROM SNMPv2-TC
    MODULE-IDENTITY, OBJECT-TYPE,
    Gauge32, Unsigned32
        FROM SNMPv2-SMI
    OBJECT-GROUP
        FROM SNMPv2-CONF;
```

```
gmplsPerfMIB MODULE-IDENTITY
```

```
    LAST-UPDATED "201104180654Z"      -- Apr 18, 2011 6:54:00 AM
```

```
    ORGANIZATION "IETF Common Control and Measurement Plane Working
Group"
```

```
    CONTACT-INFO
```

```
        "Weiqiang Sun
        Shanghai Jiao Tong University (SJTU)
        Email: sunwq@mit.edu
```

```
        Thomas D. Nadeau
        Email: thomas.nadeau@huawei.com"
```

```
DESCRIPTION
```

```
    "Copyright (C) The Internet Society (2011). This version of
    this MIB module is part of RFC XXX; see the RFC itself for
    full legal notices.
```

```
    This MIB module defines managed object definitions
    for dynamic LSP provisioning."
```

```
REVISION "201104180654Z"             -- Apr 18, 2011 6:54:00 AM
```

```
DESCRIPTION
```

```
    "Initial version."
    -- 1.3.6.1.2.1.10.166.13.1
    ::= { gmplsTeStdMIB 1 }
```

```
gmplsPerfTunnelConfigured OBJECT-TYPE
```

```
    SYNTAX      Unsigned32
    MAX-ACCESS  read-only
    STATUS      current
```



## DESCRIPTION

"The total number of tunnels configured."  
-- 1.3.6.1.2.1.10.166.13.1.3  
::= { gmplsPerfMIB 3 }

## gmplsPerfMaxEntries OBJECT-TYPE

SYNTAX Gauge32

MAX-ACCESS read-only

STATUS current

## DESCRIPTION

"An implementation MUST start assigning gmplsPerfEntryIndex values at 1 and wrap after exceeding the maximum possible value, as defined by the limit of this object.

A value of 0 for this object disables creation of gmplsPerfEntry."

-- 1.3.6.1.2.1.10.166.13.1.2  
::= { gmplsPerfMIB 2 }

## --Performance Table

## gmplsPerfTable OBJECT-TYPE

SYNTAX SEQUENCE OF GmplsPerfEntry

MAX-ACCESS not-accessible

STATUS current

## DESCRIPTION

"Defines a table for storing the results of LSP provisioning operations. It allows the provisioning performance be retrieved later for monitoring or diagnostic purposes. The recorded performance information is intended to complement the existing performance statistics in the MPLS-TE-STD-MIB and GMPLS-TE-STD-MIB.

Note that the creation and tear-down operation performances are stored in one table, ie., gmplsPerfTable. When an LSP tunnel creation operation is initiated, an entry MUST be added in this table and Tunnel ID as well as the time of initiation MUST be recorded. Upon completion of the creation process, ie., a positive signaling feedback is received by the ingress LSR, this complete time object in this entry MUST be updated.

When an LSP tunnel deletion process is initiated, the corresponding entry with the same tunnel ID MUST be located and updated with time of the deletion initiation time. When the deletion operation is complete, the entry MUST again





be updated with the completion time.

Under circumstances that the creation or deletion operation may fail, an entry may be partially updated. Eg., when a creation operation timeouts without a positive signaling feedback, the creation completion time may never be updated. When a tear-down operation is caused by nodes other than the Ingress LSR, the tear-down start time may not be known to the ingress LSR. In such cases, the user of the MIB MUST be aware of such events and treat the performance information accordingly.

The number of entries in this table is limited by the value of the corresponding `gmplsPerfMaxEntries` object. An implementation MUST start assigning `gmplsPerfEntryIndex` at 1 and wrap after exceeding the maximum possible value, as defined by the limit of `gmplsPerfMaxEntries`. An implementation of this MIB will remove the oldest entry in the `gmplsPerfTable` to allow the addition of a new entry once the number of rows in the `gmplsPerfTable` reaches the value specified by `gmplsPerfMaxEntries`."

```
-- 1.3.6.1.2.1.10.166.13.1.1
```

```
::= { gmplsPerfMIB 1 }
```

#### `gmplsPerfEntry` OBJECT-TYPE

SYNTAX `GmplsPerfEntry`

MAX-ACCESS not-accessible

STATUS current

#### DESCRIPTION

"Defines an entry in the `gmplsPerfTable`. An entry can be created when an LSP tunnel is signaled. An implementation of this MIB MAY choose to disable the creation of performance entry, when an LSP is provisioned through SNMP."

#### INDEX {

`gmplsPerfEntryIndex`,  
`gmplsPerfTunnelID` }

```
-- 1.3.6.1.2.1.10.166.13.1.1.1
```

```
::= { gmplsPerfTable 1 }
```

`GmplsPerfEntry` ::= SEQUENCE {

<code>gmplsPerfEntryIndex</code>	Gauge32,
<code>gmplsPerfTunnelID</code>	MplsTunnelIndex,
<code>gmplsPerfCurrentStatus</code>	INTEGER,
<code>gmplsPerfSrcID</code>	MplsExtendedTunnelId,



```
gmplsPerfDstID          MplsExtendedTunnelId,  
gmplsPerfCreateStartTime TimeStamp,  
gmplsPerfCreateCompleteTime TimeStamp,  
gmplsPerfDeleteStartTime TimeStamp,  
gmplsPerfDeleteCompleteTime TimeStamp }
```

gmplsPerfEntryIndex OBJECT-TYPE

SYNTAX Gauge32

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"The index of the performance entry. The number of entries in this table is limited by the value of the corresponding gmplsPerfMaxEntries object. An implementation MUST start assigning gmplsPerfEntryIndex at 1 and wrap after exceeding the maximum possible value, as defined by the limit of gmplsPerfMaxEntries. An implementation of this MIB will remove the oldest entry in the gmplsPerfTable to allow the addition of an new entry once the number of rows in the gmplsPerfTable reaches the value specified by gmplsPerfMaxEntries."

```
-- 1.3.6.1.2.1.10.166.13.1.1.1.1  
::= { gmplsPerfEntry 1 }
```

gmplsPerfTunnelID OBJECT-TYPE

SYNTAX MplsTunnelIndex

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"The ID of the tunnel being provisioned."

REFERENCE

"[RFC 3812](#)"

```
-- 1.3.6.1.2.1.10.166.13.1.1.1.2  
::= { gmplsPerfEntry 2 }
```

gmplsPerfCurrentStatus OBJECT-TYPE

SYNTAX INTEGER {

CreationInProgress(0),

Up(1),

DeletionInProgress(2),

Deleted(3) }

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"This object defines the current status of the LSP tunnel."



**CreationInProgress**

The corresponding LSP tunnel is being created, but the creation operation has not finished yet.

**Up**

The corresponding LSP tunnel has been created successfully.

**DeletionInProgress**

The corresponding LSP tunnel is being deleted, but the deletion process has not finished yet.

**Deleted**

The corresponding LSP tunnel has been deleted."

-- 1.3.6.1.2.1.10.166.13.1.1.1.3

::= { gmplsPerfEntry 3 }

**gmplsPerfSrcID OBJECT-TYPE**

SYNTAX MplsExtendedTunnelId

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"The address of the ingress LSR ID."

-- 1.3.6.1.2.1.10.166.13.1.1.1.5

::= { gmplsPerfEntry 5 }

**gmplsPerfDstID OBJECT-TYPE**

SYNTAX MplsExtendedTunnelId

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"The address of the egress LSR ID."

-- 1.3.6.1.2.1.10.166.13.1.1.1.6

::= { gmplsPerfEntry 6 }

**gmplsPerfCreateStartTime OBJECT-TYPE**

SYNTAX TimeStamp

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"The time when the tunnel setup operation is initiated."

-- 1.3.6.1.2.1.10.166.13.1.1.1.7

::= { gmplsPerfEntry 7 }



**gmplsPerfCreateCompleteTime OBJECT-TYPE**

SYNTAX TimeStamp

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"The time when the LSP tunnel create operation  
is complete."

-- 1.3.6.1.2.1.10.166.13.1.1.1.8

::= { gmplsPerfEntry 8 }

**gmplsPerfDeleteStartTime OBJECT-TYPE**

SYNTAX TimeStamp

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"The time when the LSP Tunnel tear-down operation  
is initiated."

-- 1.3.6.1.2.1.10.166.13.1.1.1.9

::= { gmplsPerfEntry 9 }

**gmplsPerfDeleteCompleteTime OBJECT-TYPE**

SYNTAX TimeStamp

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"The time when an LSP tear-down operation  
is complete."

-- 1.3.6.1.2.1.10.166.13.1.1.1.10

::= { gmplsPerfEntry 10 }

**gmplsPerfGroups OBJECT IDENTIFIER**

-- 1.3.6.1.2.1.10.166.13.1.4

::= { gmplsPerfMIB 4 }

**gmplsDeletionGroup OBJECT-GROUP**

OBJECTS {

gmplsPerfTunnelID,  
gmplsPerfCurrentStatus,  
gmplsPerfSrcID,  
gmplsPerfDstID,  
gmplsPerfDeleteStartTime,  
gmplsPerfDeleteCompleteTime }

STATUS current

DESCRIPTION

"The group of object that constitute the LSP tunnel





```
        deletion performance."
-- 1.3.6.1.2.1.10.166.13.1.4.1
 ::= { gmplsPerfGroups 1 }

gmplsCreationGroup OBJECT-GROUP
  OBJECTS {
    gmplsPerfTunnelID,
    gmplsPerfCurrentStatus,
    gmplsPerfSrcID,
    gmplsPerfDstID,
    gmplsPerfCreateStartTime,
    gmplsPerfCreateCompleteTime }
  STATUS current
  DESCRIPTION
    "The group of object that constitute the LSP tunnel
    creation performance."
-- 1.3.6.1.2.1.10.166.13.1.4.2
 ::= { gmplsPerfGroups 2 }

gmplsPerfBasicGroup OBJECT-GROUP
  OBJECTS {
    gmplsPerfEntryIndex,
    gmplsPerfTunnelID,
    gmplsPerfMaxEntries,
    gmplsPerfCurrentStatus,
    gmplsPerfCreateStartTime,
    gmplsPerfCreateCompleteTime,
    gmplsPerfDeleteStartTime,
    gmplsPerfDeleteCompleteTime,
    gmplsPerfDstID,
    gmplsPerfSrcID,
    gmplsPerfTunnelConfigured,
    gmplsPerfErrThreshold }
  STATUS current
  DESCRIPTION
    "Basic objects."
-- 1.3.6.1.2.1.10.166.13.1.4.3
 ::= { gmplsPerfGroups 3 }

END
```



## **6. References**

### **6.1. Normative References**

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- [RFC5814] Sun, W. and G. Zhang, "Label Switched Path (LSP) Dynamic Provisioning Performance Metrics in Generalized MPLS Networks", [RFC 5814](#), March 2010.



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