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**Management Information Base for the PCE Communications Protocol (PCEP)
When Requesting Point-to-Multipoint Services
draft-zhao-pce-pcep-p2mp-mib-04**

Abstract

This memo defines an experimental portion of the Management Information Base for use with network management protocols in the Internet community. In particular, it describes managed objects for modeling of the Path Computation Element communication Protocol (PCEP) for communications between a Path Computation Client (PCC) and a Path Computation Element (PCE), or between two PCEs when point-to-multipoint services are requested.

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1. Introduction

The Path Computation Element (PCE) defined in [[RFC4655](#)] is an entity that is capable of computing a network path or route based on a network graph, and applying computational constraints. A Path Computation Client (PCC) may make requests to a PCE for paths to be computed.

A P2MP LSP is comprised of multiple source-to-leaf (S2L) sub-LSPs. These S2L sub-LSPs are set up between ingress and egress LSRs and are appropriately combined by the branch LSRs using computation results from the PCE to determine the path of a P2MP TE LSP.

The PCE communication protocol (PCEP) is designed as a communication protocol between PCCs and PCEs for point-to-point (P2P) path computations and is defined in [[RFC5440](#)]. [[RFC6006](#)] explains how to extend the PCEP protocol for P2MP scenario.

[PCE-PCEP-DRAFT-MIB] defines a portion of the Management Information Base (MIB) for use with network management protocols in the Internet community for P2P path computations.

This memo defines an experimental portion of the Management Information Base for use with network management protocols in the Internet community. In particular, it describes managed objects for modeling of Path Computation Element communication Protocol (PCEP) [[RFC5440](#)] for communications between a Path Computation Client (PCC) and a Path Computation Element (PCE), or between two PCEs in P2MP scenarios.

Some objects maybe moved to [[PCE-PCEP-DRAFT-MIB](#)] after consensus with the authors and working group, these are defined in [Section 6.2](#).

2. Terminology

The following terminology is used in this document.

Domain: Any collection of network elements within a common sphere of address management or path computational responsibility. Examples of domains include Interior Gateway Protocol (IGP) areas and Autonomous Systems (ASs).

IGP: Interior Gateway Protocol. Either of the two routing protocols, Open Shortest Path First (OSPF) or Intermediate System to Intermediate System (IS-IS).

LSP: Label Switched Path.

MIB: Management Information Base.

PCC: Path Computation Client: any client application requesting a path computation to be performed by a Path Computation Element.

PCE: Path Computation Element. An entity (component, application, or network node) that is capable of computing a network path or route based on a network graph and applying computational constraints.

PCEP: Path Computation Element Communication Protocol.

P2MP: Point-to-Multipoint.

P2P: Point-to-Point.

SMI: Structure of Management Information.

SNMP: Simple Network Management Protocol.

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](#)] and STD 58, [RFC 2580](#) [[RFC2580](#)].

4. PCEP P2MP MIB Module Architecture

The PCEP P2MP MIB is just an extension of the existing architecture defined in [[PCE-PCEP-DRAFT-MIB](#)] by adding additional objects which are either common to P2P and P2MP or which are specific to P2MP. All these new objects are added into the two new tables (pcePcepExtSessionTable and pcePcepExtClientTable) defined in this new MIB module. The relationship among the two new tables to the two existing tables in [[PCE-PCEP-DRAFT-MIB](#)] are shown in the following figure:


```
pcePcepSessionTable <----- pcePcepExtSessionTable
pcePcepClientTable  <----- pcePcepExtClientTable
```

An arrow in the figure above shows that the MIB table pointed from contains a reference to the MIB table pointed to.

5. Example of the PCEP P2MP MIB module usage

In this section we provide an example (pcePcepExtClientTable 1) of using the MIB objects described in [Section 6](#) to monitor. While this example is not meant to illustrate every permutation of the MIB, it is intended as an aid to understanding some of the key concepts. It is meant to be read after going through the MIB itself.

pcePcepExtClientTable 1 of the PCE-PCEP-P2MP-DRAFT-MIB module :

```
{
    pcePcepClientP2mpCapabilityStatus    enable(1),
    pcePcepClientOverloadStatus          resumed(2),
    pcePcepClientOverloadDuration        (10),
}
```

6. Object definitions

6.1. PCE-PCEP-P2MP-DRAFT-MIB

This MIB module makes references to the following documents.

[[RFC2578](#)], [[RFC2580](#)], [[RFC3411](#)], [[RFC2863](#)], [[RFC3813](#)],
[[PCE-PCEP-DRAFT-MIB](#)].

PCE-PCEP-P2MP-DRAFT-MIB DEFINITIONS ::= BEGIN

IMPORTS

MODULE-IDENTITY, OBJECT-TYPE,
Unsigned32,
Counter32,
experimental

FROM SNMPv2-SMI -- [[RFC2578](#)]

pcePcepClientPcepId, pcePcepClientIndex,
pcePcepPeerPcepId
FROM PCE-PCEP-DRAFT-MIB

MODULE-COMPLIANCE,
OBJECT-GROUP,

FROM SNMPv2-CONF; -- [[RFC2580](#)]

pcePcepP2mpDraftMIB MODULE-IDENTITY

LAST-UPDATED "201202221200Z" -- Feb 22, 2012

ORGANIZATION "Path Computation Element (PCE) Working Group"

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"

DESCRIPTION

"This extended MIB module defines a collection of objects for managing PCE communication protocol(PCEP) when point-to-multipoint services are requested"

-- Revision history

REVISION

"201202221200Z" -- 22 Feb 2012 12:00:00 EST

DESCRIPTION

"

Main Changes from -03 draft :

1. Editorial Changes.
2. Updated Contact Information.

REVISION

"201109201200Z" -- 20 Sept 2011 12:00:00 EST

DESCRIPTION

"

Changes from -02 draft :

1. Correction of Unsigned32 to Counter32.
2. Update Email Address of the author(s)

REVISION

"201103211200Z" -- 21 Mar 2011 12:00:00 EST

DESCRIPTION

"

Changes from -01 draft :

1. Correction of spelling mistakes in the document.
2. Addition in Terminology section

REVISION

"201009151200Z" -- 15 Sep 2010 12:00:00 EST

DESCRIPTION

"

Changes from -00 draft :

1. Removed pathkey objects as these objects to be made as a new MIB module for pathkey. As per [section 6.2 of \[RFC5520\]](#).
2. Rearrangement of the sections for better understanding
3. Addition of STATUS (optional or mandatory) in the definitions
4. Addition of [section 6.2](#) to gather all objects which may be moved to [[PCE-PCEP-DRAFT-MIB](#)]"

REVISION

"201007051200Z" -- July 05 2010 12:00:00 EST

DESCRIPTION

"[draft-00](#) version"

::= { experimental 9999 } --

pcePcepExtMIBObjects OBJECT IDENTIFIER ::= { pcePcepExtDraftMIB 0 }


```
pcePcepExtConformance OBJECT IDENTIFIER ::= { pcePcepExtDraftMIB 1 }
pcePcepExtClientObjects OBJECT IDENTIFIER ::= { pcePcepExtMIBObjects
1 }

--

-- PCE Extended Client Objects

--

pcePcepClientVersionnumber OBJECT-TYPE
    SYNTAX      Unsigned32
    MAX-ACCESS  read-only
    STATUS      optional
    DESCRIPTION
        "The current version number of the PCEP protocol is 1."
    ::= { pcePcepExtClientObjects 1 }

pcePcepExtClientTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF PcePcepClientEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "This table contains information about the
        PCEP Client."
    ::= { pcePcepExtClientObjects 2 }

pcePcepExtClientEntry OBJECT-TYPE
    SYNTAX      PcePcepClientEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "An entry in this table represents a PCEP client.
        An entry can be created by a network administrator
        or by an SNMP agent as instructed by PCEP."

    INDEX      { pcePcepClientPcepId,
                  pcePcepClientIndex,
                  pcePcepPeerPcepId }

    ::= { pcePcepExtClientTable 1 }

PcePcepExtClientEntry ::= SEQUENCE {
    pcePcepClientP2mpCapabilityStatus    INTEGER,
    pcePcepClientOverloadStatus          INTEGER,
    pcePcepClientOverloadDuration        Unsigned32
}
```


pcePcepClientP2mpCapabilityStatus OBJECT-TYPE

SYNTAX INTEGER {
 enable (1),
 disable(2)
}

MAX-ACCESS read-only

STATUS mandatory

DESCRIPTION

"The P2MP capability status of this PCEP client."

::= { pcePcepExtClientEntry 1 }

pcePcepClientOverloadStatus OBJECT-TYPE

SYNTAX INTEGER {
 overloaded(1),
 resumed(2)
}

MAX-ACCESS read-only

STATUS optional

DESCRIPTION

"The Overload status of this PCE client."

::= { pcePcepExtClientEntry 2 }

pcePcepClientOverloadDuration OBJECT-TYPE

SYNTAX Unsigned32

UNITS "seconds"

MAX-ACCESS read-only

STATUS optional

DESCRIPTION

"The period of time during which no further request should be sent to the PCE client. Once this period of time has elapsed, the PCE client should no longer be considered in a congested state."

::= { pcePcepExtClientEntry 3 }

pcePcepExtSessionObjects OBJECT IDENTIFIER ::= { pcePcepExtMIBObjects
2 }

--

-- The PCEP Ext Sessions Table

--

pcePcepExtSessionTable OBJECT-TYPE

SYNTAX SEQUENCE OF pcePcepExtSessionEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"A table of extended sessions characteristics between
PCEP clients. Each row in this table represents a
single session."

::= { pcePcepExtSessionObjects 1 }

pcePcepExtSessionEntry OBJECT-TYPE

SYNTAX pcePcepExtSessionEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"An entry in this table represents information on a
single session between two PCEP clients.
The information contained in a row is read-only."

::= { pcePcepExtSessionTable 1 }


```

PcePcepExtSessionEntry ::= SEQUENCE {
    pcePcepSessionP2mpPCReqMessagesSent      Counter32,
    pcePcepSessionP2mpPCRepMessagesSent      Counter32,
    pcePcepSessionP2mpPCReqMessagesReceived Counter32,
    pcePcepSessionP2mpPCRepMessagesReceived Counter32,
    pcePcepSessionP2mpAddLeaves               Counter32,
    pcePcepSessionP2mpRemoveLeaves            Counter32,
    pcePcepSessionP2mpModifyLeaves            Counter32,
    pcePcepSessionP2mpUnchangedLeaves         Counter32,
    pcePcepSessionTotalMessagesSent           Counter32,
    pcePcepSessionOpenMessagesSent            Counter32,
    pcePcepSessionKeepaliveMessagesSent       Counter32,
    pcePcepSessionPCNtfMessagesSent           Counter32,
    pcePcepSessionPCErrMessagesSent           Counter32,
    pcePcepSessionTotalMessagesReceived        Counter32,
    pcePcepSessionOpenMessagesReceived         Counter32,
    pcePcepSessionKeepaliveMessagesReceived   Counter32,
    pcePcepSessionPCNtfMessagesReceived        Counter32,
    pcePcepSessionPCErrMessagesReceived        Counter32,
    pcePcepSessionIntraDomainRequest           Counter32,
    pcePcepSessionInterDomainRequest           Counter32,
    pcePcepSessionSuccessComps                 Counter32,
    pcePcepSessionNoReply                      Counter32,
    pcePcepSessionSynchronization              Counter32,
    pcePcepSessionReoptimization               Counter32,
    pcePcepSessionFragmentation                Counter32,
    pcePcepSessionP2pPCReqMessagesSent        Counter32,
    pcePcepSessionP2pPCRepMessagesSent        Counter32,
    pcePcepSessionP2pPCReqMessagesReceived    Counter32,
    pcePcepSessionP2pPCRepMessagesReceived    Counter32,
}

```

pcePcepSessionP2mpPCReqMessagesSent OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS mandatory

DESCRIPTION

"The number of P2MP Request messages sent on this session."

::= { pcePcepExtSessionEntry 1 }

pcePcepSessionP2mpPCRepMessagesSent OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS mandatory

DESCRIPTION

"The number of P2MP Reply messages sent on this session."

::= { pcePcepExtSessionEntry 2 }

pcePcepSessionP2mpPCReqMessagesReceived OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS mandatory

DESCRIPTION

"The number of P2MP Request messages received on this session."

::= { pcePcepExtSessionEntry 3 }

pcePcepSessionP2mpPCRepMessagesReceived OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS mandatory

DESCRIPTION

"The number of P2MP Reply messages received on this session."

::= { pcePcepExtSessionEntry 4 }

pcePcepSessionP2mpAddLeaves OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS mandatory

DESCRIPTION

"The number of leaves to be Added (Type1) for the total P2MP requests (PCReq message) received by the PCE."

::= { pcePcepExtSessionEntry 5 }

pcePcepSessionP2mpRemoveLeaves OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS mandatory

DESCRIPTION

"The number of leaves to be Removed (Type2) for the total P2MP requests (PCReq message) received by the PCE."

::= { pcePcepExtSessionEntry 6 }

pcePcepSessionP2mpModifyLeaves OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS mandatory

DESCRIPTION

"The number of leaves to be Modified (Type3) for the total P2MP requests (PCReq message) received by the PCE."

::= { pcePcepExtSessionEntry 7 }

pcePcepSessionP2mpUnchangedLeaves OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS mandatory

DESCRIPTION

"The number of leaves not to be changed (Type4) for
the total P2MP requests (PCReq message) received
by the PCE."

::= { pcePcepExtSessionEntry 8 }

pcePcepSessionTotalMessagesSent OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS mandatory

DESCRIPTION

"The total number of PCEP messages sent on this
session."

::= { pcePcepExtSessionEntry 9 }

pcePcepSessionOpenMessagesSent OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS mandatory

DESCRIPTION

"The number of Open messages sent on this session."

::= { pcePcepExtSessionEntry 10 }

pcePcepSessionKeepaliveMessagesSent OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS mandatory

DESCRIPTION

"The number of Keepalive messages sent on this session."

::= { pcePcepExtSessionEntry 11 }

pcePcepSessionPCNtfMessagesSent OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS mandatory

DESCRIPTION

"The number of PCNtf messages sent on this session."

::= { pcePcepExtSessionEntry 12 }

pcePcepSessionPCErrMessagesSent OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS mandatory

DESCRIPTION

"The number of PCErr messages sent on this session."

::= { pcePcepExtSessionEntry 13 }

pcePcepSessionTotalMessagesReceived OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS mandatory

DESCRIPTION

"The total number of PCEP messages received on this session."

::= { pcePcepExtSessionEntry 14 }

pcePcepSessionOpenMessagesReceived OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS mandatory

DESCRIPTION

"The number of Open messages received on this session."

::= { pcePcepExtSessionEntry 15 }

pcePcepSessionKeepaliveMessagesReceived OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS mandatory

DESCRIPTION

"The number of Keepalive messages received on this session."

::= { pcePcepExtSessionEntry 16 }

pcePcepSessionPCNtfMessagesReceived OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS mandatory

DESCRIPTION

"The number of PCNtf messages received on this session."

::= { pcePcepExtSessionEntry 17 }

pcePcepSessionPCErrMessagesReceived OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS mandatory

DESCRIPTION

"The number of PCErr messages received on this session."

::= { pcePcepExtSessionEntry 18 }

pcePcepSessionIntraDomainRequest OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS optional

DESCRIPTION

"The number of requests sent for the Intra-Domain path computation."

::= { pcePcepExtSessionEntry 19 }

pcePcepSessionInterDomainRequest OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS optional

DESCRIPTION

"The number of requests sent for the Inter-Domain path computation."

::= { pcePcepExtSessionEntry 20 }

pcePcepSessionSuccessComps OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS optional

DESCRIPTION

"The number of requests which had successful computations. In case of PCC-PCE session, it is core computation value and in case of PCE-PCE session, it is transit computation value."

::= { pcePcepExtSessionEntry 21 }

pcePcepSessionNoReply OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS optional

DESCRIPTION

" The number of requests which had not been replied either success or failure."

::= { pcePcepExtSessionEntry 22 }

pcePcepSessionSynchronization OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS optional

DESCRIPTION

"The number of synchronized path computation requests
that can be either dependent or independent."

::= { pcePcepExtSessionEntry 23 }

pcePcepSessionReoptimization OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS optional

DESCRIPTION

"The number of requests for Reoptimization."

::= { pcePcepExtSessionEntry 24 }

pcePcepSessionFragmentation OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS optional

DESCRIPTION

"The number of packets of a PCReq / PCRep
message which had been fragmented."

::= { pcePcepExtSessionEntry 25 }

pcePcepSessionP2pPCReqMessagesSent OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS mandatory

DESCRIPTION

"The number of P2P Request messages sent on this
session."

::= { pcePcepExtSessionEntry 26 }

pcePcepSessionP2pPCRepMessagesSent OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS mandatory

DESCRIPTION

"The number of P2P Reply messages sent on this session."

::= { pcePcepExtSessionEntry 27 }


```
pcePcepSessionP2pPCReqMessagesReceived OBJECT-TYPE
    SYNTAX Counter32
    MAX-ACCESS read-only
    STATUS mandatory
    DESCRIPTION
        "The number of P2P PCReq messages received on this
        session."
    ::= { pcePcepExtSessionEntry 28 }
```

```
pcePcepSessionP2pPCRepMessagesReceived OBJECT-TYPE
    SYNTAX Counter32
    MAX-ACCESS read-only
    STATUS mandatory
    DESCRIPTION
        "The number of P2P PCRep messages received on this
        session."
    ::= { pcePcepExtSessionEntry 29 }
```

```

-- *****
--  Module Conformance Statement
--  *****

```

```
pcePcepExtGroups
    OBJECT IDENTIFIER ::= { pcePcepExtConformance 1 }
```

```
pcePcepExtCompliances
    OBJECT IDENTIFIER ::= { pcePcepExtConformance 2 }
```

```
--
-- Full Compliance
--
```

[illegible]


```
--
-- Read-Only Compliance
--

pcePcepExtModuleReadOnlyCompliance MODULE-COMPLIANCE
    STATUS current
    DESCRIPTION
        "The Module is implemented with support
        for read-only.  In other words, only monitoring
        is available by implementing this MODULE-COMPLIANCE."

    MODULE -- this module
        MANDATORY-GROUPS { pcePcepExtGeneralGroup,
                           }
        ::= { pcePcepExtCompliances 2 }

-- units of conformance
```


pcePcepExtGeneralGroup OBJECT-GROUP

OBJECTS {

pcePcepClientP2mpCapabilityStatus,
pcePcepSessionP2mpPCReqMessagesSent,
pcePcepSessionP2mpPCRepMessagesSent,
pcePcepSessionP2mpPCReqMessagesReceived,
pcePcepSessionP2mpPCRepMessagesReceived,
pcePcepSessionP2mpAddLeaves,
pcePcepSessionP2mpRemoveLeaves,
pcePcepSessionP2mpModifyLeaves,
pcePcepSessionP2mpUnchangedLeaves,
pcePcepSessionTotalMessagesSent,
pcePcepSessionOpenMessagesSent,
pcePcepSessionKeepaliveMessagesSent,
pcePcepSessionPCNtfMessagesSent,
pcePcepSessionPCErrMessagesSent,
pcePcepSessionTotalMessagesReceived,
pcePcepSessionOpenMessagesReceived,
pcePcepSessionKeepaliveMessagesReceived,
pcePcepSessionPCNtfMessagesReceived,
pcePcepSessionPCErrMessagesReceived,
pcePcepSessionP2pPCReqMessagesSent,
pcePcepSessionP2pPCRepMessagesSent,
pcePcepSessionP2pPCReqMessagesReceived,
pcePcepSessionP2pPCRepMessagesReceived
}

STATUS current

DESCRIPTION

"Objects that apply to all PCEP P2MP MIB implementations."

::= { pcePcepExtGroups 1 }

END

6.2. Objects for inclusion in module PCE-PCEP-DRAFT-MIB

Following are the objects maybe moved to [[PCE-PCEP-DRAFT-MIB](#)] after consensus with the authors and working group.

pcePcepClientVersionnumber,
pcePcepClientP2mpCapabilityStatus,
pcePcepClientOverloadStatus,
pcePcepClientOverloadDuration,
pcePcepSessionTotalMessagesSent,
pcePcepSessionOpenMessagesSent,
pcePcepSessionKeepaliveMessagesSent,
pcePcepSessionPCNtfMessagesSent,
pcePcepSessionPCErrMessagesSent,
pcePcepSessionTotalMessagesReceived,
pcePcepSessionOpenMessagesReceived,
pcePcepSessionKeepaliveMessagesReceived,
pcePcepSessionPCNtfMessagesReceived,
pcePcepSessionPCErrMessagesReceived,
pcePcepSessionIntraDomainRequest,
pcePcepSessionInterDomainRequest,
pcePcepSessionSuccessComps,
pcePcepSessionNoReply,
pcePcepSessionSynchronization,
pcePcepSessionReoptimization,
pcePcepSessionFragmentation,
pcePcepSessionP2pPCReqMessagesSent,
pcePcepSessionP2pPCRepMessagesSent,
pcePcepSessionP2pPCReqMessagesReceived,
pcePcepSessionP2pPCRepMessagesReceived

7. IANA Considerations

TBD

8. Security Considerations

The readable objects in the PCE-PCEP-P2MP-DRAFT-MIB module (i.e., those with MAX-ACCESS other than not-accessible) may be considered sensitive in some environments since, collectively, they provide information about the amount and frequency of path computation requests and responses within the network and can reveal some aspects of their configuration.

In such environments it is important to control also GET and NOTIFY access to these objects and possibly even to encrypt their values 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. References

9.1. Normative References

- [RFC2578] McCloghrie, K., Ed., Perkins, D., Ed., and J. Schoenwaelder, Ed., "Structure of Management Information Version 2 (SMIv2)", STD 58, [RFC 2578](#), April 1999.
- [RFC2580] McCloghrie, K., Perkins, D., and J. Schoenwaelder, "Conformance Statements for SMIv2", STD 58, [RFC 2580](#), April 1999.
- [RFC2863] McCloghrie, K. and F. Kastenholz, "The Interfaces Group MIB", [RFC 2863](#), June 2000.
- [RFC3411] Harrington, D., Presuhn, R., and B. Wijnen, "An Architecture for Describing Simple Network Management Protocol (SNMP) Management Frameworks", STD 62, [RFC 3411](#), December 2002.
- [RFC3813] Srinivasan, C., Viswanathan, A., and T. Nadeau, "Multiprotocol Label Switching (MPLS) Label Switching Router (LSR) Management Information Base (MIB)", [RFC 3813](#), June 2004.
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9.2. Informative References

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