A Supplementary History Module for the MPLS LDP-MIB

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Abstract

In this document, requirements for supplementing the MPLS LDP-MIB are presented for the support of specific network management needs for fault and performance management. Based on these requirements, it describes managed objects in a supplementary history module for use with the LDP-MIB.

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 RFC-2119.

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1. Introduction

In this document, we first present requirements for supplementing the MPLS LDP-MIB [1] based on testing in our lab that was focused on providing a management solution for planned services (e.g., MPLS VPN). We then propose a history module that supplements the LDP-MIB for fulfilling these requirements.

The requirements are for the support of specific network management needs in the areas of fault and performance management. For example, through our testing of the LDP-MIB [1], we found that some of the objects require enhancements to make it more effective to identify the fault condition (and thus more effective for troubleshooting and trouble resolution), while other objects require new sub-object(s) to present a certain level of aggregation to meet operational need.

Requirements for supplementing the LDP-MIB are described in Section 2. We do not propose changing the existing LDP-MIB. Rather, specific MIB extensions or objects based on the requirements are proposed for a supplementary history module as defined in Section 3. This history module is designed to work in conjunction with the LDP-MIB.

This initial draft is intended to present mainly the objects needed to support the stated requirements. We would like to solicit comments and suggestions from MIB designers, especially on issues such as interoperability with the existing LDP-MIB. As such, this version of the draft does not currently comply with standard formats of MIB documents such as the inclusion of a MIB Boilerplate Section and standard references. We will address such compliance issues in the next version.

2. Requirements for Supplementing the LDP-MIB

2.1 Performance Management Requirement

In the LDP-MIB of an LSR, there is an LDP Entity for each LDP-enabled interface. Each such entity is a collection of
configuration, control, and status information for the establishment of LDP Sessions. In particular, it contains the label objects, in either the Generic Label Space or the Per-Interface Label Space. An LDP Session is set up by using one of these label objects.

For engineering of LDP Sessions and router resource management, there is a need to capture the signaling usage/performance of the LDP Entities, as well as the traffic usage/performance of the LDP Sessions. Currently in the LDP-MIB, in the LDP Entity Statistics Table mplsLdpEntityStatsTable, there is the mplsLdpEntityStatsSessionAttempts counter for the number of session initializations that failed. Other than that, there are no objects to provide the necessary counters to record usage for either the Generic Label Space Entities or the Per-Interface Label Space Entities.

To support LDP Entity and Session statistics reports for MPLS performance management, enhancement to the LDP-MIB is needed to provide summary statistics on the health of LDP Entities and Sessions to capture the usage/performance characteristics.

Furthermore, such enhancement should provide a linkage between the LDP Entity/Session and the physical interface to aid troubleshooting by a service provider. It would be unacceptable to have to go through many hoops of NMS processing/analysis to get such information. Not only will this process not meet the real-time network management response time requirement, the reliability of the resulting information is also questionable.

2.2 Drawbacks of existing approach

To provide a high-level barometer of the performance of LDP Entity/Sessions, we need a way to get aggregate counts for performance monitoring reasons, so that the ratio of attempts and successful attempts can be estimated.

For an LDP Session that has been established on an LDP Entity, there will be a notification if the session goes up/down. Thus, it is possible for a gauge32-like object for an Established Session Counter to be gleaned from the number of mplsLdpSessionEntry’s and from examining the mplsLdpEntityGenericLREntry’s for the Generic Label Space. Similarly, for the equivalent of the Terminated Session Counter, a count of the glitches in the Session related to Generic Labels could possibly be figured out by polling the mplsLdpSessionDiscontinuityTime object for the LDP Entities that are associated with a Generic Label range. For the Per-Interface Label space, one would look at the Interface Label tables associated with an Entity instead of the Generic Label Range table. Note that, as currently specified, once a Session is started, the label range tables cannot change. This means that once an NMS retrieves the Entity and Label range information, it will be fairly static. Hence, the NMS can just poll the mplsLdpEntityLastChange to see if there are changes to the Entity table.
While existing procedures are available as described above, such procedures also depend mostly on the NMS to perform different manipulation of the MIB-collected data to make them meaningful. Given that LDP itself is complicated enough, a more useful approach would be to not rely on the NMS to do too much work to understand the performance of LDP. As far as possible, a solution must not require extensive MIB walks of the LDP-MIB, to avoid the consumption of valuable network resources, e.g., by reducing the volume of MIB data that needs to be transmitted and subsequently processed by the NMS. Note that reduction of the volume of data transmission may help to increase the data reliability as well.

2.3 Fault Management Requirement

It is required to ensure persistency of information in the LDP-MIB Entity Table and Entity Statistics Table, whenever an LDP Entity is disabled and then re-enabled.

Currently, the instrumentations in the Entity Table and the Entity Statistics Table will only show active LDP Entities (i.e., those with enabled status). When an LDP Entity goes up and down, its entry in the Entity Table appears and then disappears entirely. This will result in the loss of historical information related to the LDP Entity status and performance information. An enhancement is needed so the counters will accumulate with prior-entity ID-counters.

2.4 Summary of Objects

The following tables are included in the History Module to provide summary statistics on the health of LDP entities and sessions to capture the usage/performance of LDP sessions:

MPLS LDP Entity History Table: mplsLdpEntityHistTable
MPLS LDP Session History Table: mplsLdpSessionHistTable

3. MPLS LDP History Module Definitions

(Note: In this version, only the objects for recording usage counts are included. Specifications for measurement intervals and counters for different intervals to maintain history are to be included in the next version. Also, an index may need to be provided to map the LDP entity with its associated IfIndex in the IF-MIB.)

MPLS-LDP-HIST-STD-MIB DEFINITIONS ::= BEGIN

IMPORTS
OBJECT-TYPE, MODULE-IDENTITY, NOTIFICATION-TYPE,
Counter32
FROM SNMPv2-SMI
MODULE-COMPLIANCE, OBJECT-GROUP, NOTIFICATION-GROUP

FROM SNMPv2-CONF

mplsStdMIB
FROM MPLS-TC-STD-MIB

mplsLdpEntityTable,
mplsLdpSessionTable
FROM MPLS-LDP-STD-MIB;

mplsLdpHistStdMIB MODULE-IDENTITY
LAST-UPDATED "200310171200Z"  -- 17 October 2003
ORGANIZATION "Multiprotocol Label Switching (mpls)
Working Group"

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MPLS Working Group, email: mpls@uu.net"

DESCRIPTION
"Copyright (C) The Internet Society (2003). This
version of this MIB module is part of RFCXXX; see
the RFC itself for full legal notices.

This MIB Module contains managed object definitions for the
'Multiprotocol Label Switching, Label Distribution
Protocol, LDP History Module' document."

-- Revision History

REVISION "200310171200Z"  -- 17 October 2003
DESCRIPTION
"Initial draft version."

::= { mplsStdMIB XXX }  -- to be assigned by IANA

--****************************************************************

mplsLdpHistObjects OBJECT IDENTIFIER ::= { mplsLdpHistStdMIB 1 }

--****************************************************************

-- MPLS LDP History Module Objects
--****************************************************************

--
-- The MPLS LDP Entity History Table
--
mplsLdpEntityHistTable OBJECT-TYPE
SYNTAX      SEQUENCE OF MplsLdpEntityHistEntry
MAX-ACCESS  not-accessible
STATUS      current
DESCRIPTION
 "This table is a read-only table which augments the mplsLdpEntityTable. The purpose of this table is to keep historical statistics information about the LDP Entities on the LSR."
::= { mplsLdpHistObjects 1 }

mplsLdpEntityHistEntry OBJECT-TYPE
SYNTAX      MplsLdpEntityHistEntry
MAX-ACCESS  not-accessible
STATUS      current
DESCRIPTION
 "A row in this table contains statistical information about an LDP Entity."
AUGMENTS       {   mplsLdpEntityEntry  }
::= { mplsLdpEntityHistTable 1 }

MplsLdpEntityHistEntry ::= SEQUENCE {
  mplsLdpEntityHistAttemptedSession     Counter32,
  mplsLdpEntityHistEstablishedSessions  Counter32,
  mplsLdpEntityHistTerminatedSessions   Counter32
}

mplsLdpEntityHistAttemptedSessions OBJECT-TYPE
SYNTAX      Counter32
MAX-ACCESS  read-only
STATUS      current
DESCRIPTION
 "This value indicates the specific number of attempts made to establish LDP Sessions between two peers in the corresponding label space, whether those attempts are successful or not. This is a running counter that is only re-initialized whenever the LDP Entity is initialized."
::= { mplsLdpEntityHistEntry 1 }

mplsLdpEntityHistEstablishedSessions OBJECT-TYPE
SYNTAX      Counter32
MAX-ACCESS  read-only
STATUS      current
DESCRIPTION
 "This value indicates the specific number of successful attempts made to establish LDP Sessions between two peers in the corresponding label space. This is a running counter that is only re-initialized whenever the LDP Entity is initialized."
::= { mplsLdpEntityHistEntry 2 }

mplsLdpEntityHistTerminatedSessions OBJECT-TYPE
SYNTAX      Counter32
This value indicates the specific number of terminated LDP sessions between two peers in the corresponding label space. This is a running counter that is only re-initialized whenever the LDP Entity is initialized.

 ::= { mplsLdpEntityHistEntry 3 }

--

-- The MPLS LDP Session History Table
--

mplsLdpSessionHistTable OBJECT-TYPE
SYNTAX        SEQUENCE OF MplsLdpSessionHistEntry
MAX-ACCESS    not-accessible
STATUS        current
DESCRIPTION    "A table of historical statistical information for Sessions between the LDP Entities and LDP Peers. This table AUGMENTS the mplsLdpSessionTable. Each row in this table represents a single session."
 ::= { mplsLdpHistObjects 2 }

mplsLdpSessionHistEntry OBJECT-TYPE
SYNTAX        MplsLdpSessionHistEntry
MAX-ACCESS    not-accessible
STATUS        current
DESCRIPTION    "An entry in this table represents information on a single session between an LDP Entity and LDP Peer. The information contained in a row is read-only."
AUGMENTS      { mplsLdpSessionEntry }
 ::= { mplsLdpSessionHistTable 1 }

MplsLdpSessionHistEntry ::= SEQUENCE {
  mplsLdpSessionHistSuccessPackets     Counter32,
  mplsLdpSessionHistUnsuccessPackets  Counter32
}

mplsLdpSessionHistSuccessPackets OBJECT-TYPE
SYNTAX        Counter32
MAX-ACCESS    read-only
STATUS        current
DESCRIPTION    "This value indicates the specific number of packets successfully sent over the LDP Sessions. This is a running counter that is only re-initialized whenever the associated LDP Entity is initialized."
 ::= { mplsLdpSessionHistEntry 1 }
mplsLdpSessionHistUnsuccessPackets OBJECT-TYPE
   SYNTAX      Counter32
   MAX-ACCESS  read-only
   STATUS      current
   DESCRIPTION
   "This value indicates the specific number of packets unsuccessfully sent over
   the LDP Sessions. This is a running counter that is only re-initialized whenever
   the associated LDP Entity is initialized."
   ::= { mplsLdpSessionHistEntry 2 }

END

4. Conclusions
To be added.

5. Security Considerations
To be added.

6. References

Normative References

1  J. Cucchiara, H. Sjostrand, and J. Luciani, "Definitions of Managed Objects for the Multiprotocol Label Switching, Label Distribution Protocol (LDP)," Internet-Draft, Work in Progress.

Informative References

7. Acknowledgments
To be added.

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