Virtual Private LAN Service (VPLS) Management Information Base

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 to configure and/or monitor Virtual Private LAN services. It needs to be used in conjunction with the Pseudowire (PW) Management Information Base (PW-STD-MIB from RFC 5601).

Status of This Memo

This is an Internet Standards Track document.

This document is a product of the Internet Engineering Task Force (IETF). It represents the consensus of the IETF community. It has received public review and has been approved for publication by the Internet Engineering Steering Group (IESG). Further information on Internet Standards is available in Section 2 of RFC 5741.

Information about the current status of this document, any errata, and how to provide feedback on it may be obtained at http://www.rfc-editor.org/info/rfc7257.
This memo defines a portion of the Management Information Base (MIB) for use with network management protocols in the Internet community. In particular, it defines three MIB modules that can be used to manage VPLS (Virtual Private LAN Service) for transmission over a Packet Switched Network (PSN) using LDP [RFC4762] or BGP [RFC4761] signaling. This MIB module provides generic management of VPLS services as defined by the IETF L2VPN Working Group. Additional MIB modules are also defined for management of LDP VPLS and BGP VPLS services by the IETF L2VPN Working Group.

2. Terminology

This document adopts the definitions, acronyms, and mechanisms described in [RFC3985]. Unless otherwise stated, the mechanisms of [RFC3985] apply and will not be described again here.
2.1. 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 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 MIB modules that are 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. VPLS MIB Module Architecture

The MIB structure for defining a VPLS service is composed from three MIB modules. (They are referred to as "VPLS MIB" in the figure below.)

The first is the VPLS-GENERIC-MIB module, which configures general parameters of the VPLS service that are common to all types of VPLS services.

The second is the VPLS-LDP-MIB module, which configures VPLS-LDP [RFC4762] specific parameters of the VPLS service.

The third is the VPLS-BGP-MIB module, which configures VPLS-BGP [RFC4761] specific parameters of the VPLS service.

The arrows in Figure 1 indicate whether we can map data from one module into another.
Additionally, service-specific modules may be defined in other documents.

4.1. VPLS-GENERIC-MIB Module Usage

An entry in the vplsConfigTable MUST exist for every VPLS service. This table holds generic parameters that apply to a VPLS service which can be signaled via LDP or BGP.

A conceptual row can be created in the vplsConfigTable in one of the following ways:

1) A Network Management System (NMS) creates a row in the vplsConfigTable using Simple Network Management Protocol (SNMP) Set requests, which causes the node to create and start a new VPLS service. The agent MUST support the creation of VPLS services in this way.

2) The agent MAY create a row in the vplsConfigTable automatically due to some auto discovery application, or based on configuration that is done through non-SNMP applications. This mode is OPTIONAL.

At least one entry in the vplsPwBindTable MUST exist for each VPLS service.

This Binding table links one VPLS service with one or many pseudowires (defined in [RFC5601]). Each pseudowire may be used as a spoke or as part of a mesh based on the parameters defined in this table.

For each VPLS service, an entry in the vplsBgpAdConfigTable MUST exist if Auto-discovery has been enabled for that service. This table stores the information required for auto-discovery.
For each VPLS service, at least one entry in the vplsBgpRteTargetTable MUST exist if auto-discovery has been configured for that service. One service can import and export multiple Route Targets.

4.2. VPLS-LDP-MIB Module Usage

An entry in the vplsLdpConfigTable MUST be created by the agent for a VPLS service signaled using LDP.

4.3. VPLS-BGP-MIB Module Usage

An entry in the vplsBgpConfigTable MUST be created by the agent for a VPLS service signaled using BGP.

4.4. Relations to Other MIB Modules

- The vplsPwBindTable links the VPLS entry to the pwTable in [RFC5601].

- The association of Media Access Control (MAC) addresses to VPLS entries is possible by adding a turnstile function to interpret the entries in [SNMP-CONTEXT-MAP-MIB]. In [SNMP-CONTEXT-MAP-MIB], there is a mapping from the vacmContextName [RFC3415] to dot1dBasePort [RFC4188] and vplsConfigIndex. This mapping can be used to map the vplsConfigIndex to a dot1dBasePort in the BRIDGE-MIB. This resulting value of dot1dBasePort can be used to access corresponding MAC addresses that belong to a particular vplsConfigIndex.

- Unless all the necessary entries in the applicable tables have been created and all the parameters have been consistently configured in those tables, signaling cannot be performed from the local node, and the vplsConfigRowStatus should report 'notReady'.

- Statistics can be gathered from the PW Performance tables in [RFC5601].

5. Example of the VPLS MIB Modules Usage

In this section, we provide an example of the use of the MIB objects described in Section 6 to set up a VPLS service over MPLS. 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.
In this example, a VPLS service (VPLS-A) is set up using LDP for signaling the pseudowire. The Binding between the VPLS service and the pseudowire is reflected in the VplsPwBindTable. The pseudowire configuration is defined in RFC 5601.

In the VPLS-GENERIC-MIB module:

Row in vplsConfigTable:
{
    vplsConfigIndex 10,
    vplsConfigName "VPLS-A",
    vplsConfigAdminStatus 1(up),
    vplsConfigMacLearning 1(true),
    vplsConfigDiscardUnknownDest 2(false),
    vplsConfigMacAging 1(true),
    vplsConfigVpnId "100:10",
    vplsConfigRowStatus 1(active)
}

Row in vplsStatusTable:
{
    vplsStatusOperStatus 1(up),
    vplsStatusPeerCount 1
}

Row in VplsPwBindTable :
{
    vplsPwBindConfigType manual,
    vplsPwBindType spoke,
    vplsPwBindRowStatus 1(active),
    vplsPwBindStorageType volatile
}

In the VPLS-LDP-MIB module:

Row in vplsLdpConfigTable:
{
    vplsLdpConfigMacAddrWithdraw 1(true),
}

Row in vplsLdpPwBindTable:
{
    vplsLdpPwBindType 1(mesh),
    vplsLdpPwBindMacAddressLimit 100
}
6. Object Definitions

6.1. VPLS-GENERIC-MIB Object Definitions

This MIB module mentions the following documents: [RFC2578], [RFC2579], [RFC2580], [RFC3411], [RFC5601], [RFC4265], [RFC4364], [RFC4761], [RFC4762], [RFC6074], and [RFC3413].

VPLS-GENERIC-MIB DEFINITIONS ::= BEGIN

IMPORTS

NOTIFICATION-TYPE, MODULE-IDENTITY, OBJECT-TYPE, Unsigned32, Counter32, transmission
FROM SNMPv2-SMI                    -- RFC 2578

MODULE-COMPLIANCE, OBJECT-GROUP, NOTIFICATION-GROUP
FROM SNMPv2-CONF                   -- RFC 2580

TruthValue, RowStatus, StorageType, TEXTUAL-CONVENTION
FROM SNMPv2-TC                     -- RFC 2579

SnmpAdminString
FROM SNMP-FRAMEWORK-MIB            -- RFC 3411

pwIndex
FROM PW-STD-MIB                    -- RFC 5601

VPNIdOrZero
FROM VPN-TC-STD-MIB                -- RFC 4265

;

vplsgenericMIB MODULE-IDENTITY
LAST-UPDATED "201405191200Z"  -- 19 May 2014 12:00:00 GMT
ORGANIZATION "Layer 2 Virtual Private Networks (L2VPN)
Working Group"

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"
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The L2VPN Working Group (email distribution l2vpn@ietf.org,
http://www.ietf.org/wg/l2vpn/charter)
"

Nadeau, et al. Standards Track [Page 8]
DESCRIPTION
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The initial version of this MIB module was published in RFC 7257; for full legal notices see the RFC itself.

This MIB module contains generic managed object definitions for Virtual Private LAN Service as defined in RFC 4761 and RFC 4762.

This MIB module enables the use of any underlying pseudowire network."

-- Revision history.
REVISION
"201405191200Z"  -- 19 May 2014 12:00:00 GMT

DESCRIPTION "Initial version published as part of RFC 7257."
 ::= { transmission 274 }

VplsBgpRouteDistinguisher ::= TEXTUAL-CONVENTION
STATUS current
DESCRIPTION "Syntax for a route distinguisher that matches the definition in RFC 4364. For a complete definition of a route distinguisher, see RFC 4364. For more details on use of a route distinguisher for a VPLS service, see RFC 4761."
REFERENCE "RFC 4364"
SYNTAX OCTET STRING(SIZE (0..256))

VplsBgpRouteTarget ::= TEXTUAL-CONVENTION
STATUS current
DESCRIPTION "Syntax for a Route Target that matches the definition in RFC 4364. For a complete definition of a Route Target, see RFC 4364."
REFERENCE "RFC 4364"
SYNTAX OCTET STRING(SIZE (0..256))

VplsBgpRouteTargetType ::= TEXTUAL-CONVENTION
STATUS current
DESCRIPTION "Used to define the type of a Route Target usage. Route Targets can be specified to be imported, exported, or both. For a complete definition of a Route Target, see RFC 4364."
REFERENCE "RFC 4364"
SYNTAX INTEGER { import(1), export(2), both(3) }

-- Top-level components of this MIB.

-- Notifications
vplsNotifications OBJECT IDENTIFIER ::= { vplsGenericMIB 0 }

-- Tables, Scalars
vplsObjects OBJECT IDENTIFIER ::= { vplsGenericMIB 1 }

-- Conformance
vplsConformance OBJECT IDENTIFIER ::= { vplsGenericMIB 2 }

-- PW Virtual Connection Table

vplsConfigIndexNext OBJECT-TYPE
SYNTAX Unsigned32
MAX-ACCESS read-only
STATUS current
DESCRIPTION "This object contains an appropriate value to be used for vplsConfigIndex when creating entries in the vplsConfigTable. The value 0 indicates that no unassigned entries are available. To obtain the value of vplsConfigIndex for a new entry in the vplsConfigTable, the manager issues a management protocol retrieval operation to obtain the current value of vplsConfigIndex. After each retrieval operation, the agent should modify the value to reflect the next unassigned index. After a manager retrieves a value the agent will determine through its local policy when this index value will be made available for reuse."
 ::= { vplsObjects 1 }

vplsConfigTable OBJECT-TYPE
SYNTAX          SEQUENCE OF VplsConfigEntry
MAX-ACCESS      not-accessible
STATUS          current
DESCRIPTION     "This table specifies information for configuring
                and monitoring Virtual Private LAN Service (VPLS).
                
                ::= { vplsObjects 2 }

vplsConfigEntry OBJECT-TYPE
SYNTAX          VplsConfigEntry
MAX-ACCESS      not-accessible
STATUS          current
DESCRIPTION     "A row in this table represents a Virtual Private LAN
                Service (VPLS) in a packet network. It is indexed by
                vplsConfigIndex, which uniquely identifies a single VPLS.

A row is created via SNMP or by the agent if a
VPLS service is created by a non-SNMP application or
due to the Auto-Discovery process.

All of the read-create objects values except
vplsConfigSignalingType can be changed when
vplsConfigRowStatus is in the active(1)
state. Changes for vplsConfigSignalingType are only
allowed when the vplsConfigRowStatus is in
notInService(2) or notReady(3) states.

INDEX           { vplsConfigIndex }
 ::= { vplsConfigTable 1 }

VplsConfigEntry ::= SEQUENCE {
vplsConfigIndex                               Unsigned32, vplsConfigName                                SnmpAdminString, vplsConfigDescr                               SnmpAdminString, vplsConfigAdminStatus                         INTEGER, vplsConfigMacLearning                         TruthValue, vplsConfigDiscardUnknownDest                  TruthValue, vplsConfigMacAging                            TruthValue, vplsConfigFwdFullHighWatermark                Unsigned32, vplsConfigFwdFullLowWatermark                 Unsigned32, vplsConfigRowStatus                           RowStatus, vplsConfigMtu                                 Unsigned32, vplsConfigVpnId                               VPNIdOrZero, vplsConfigStorageType                        StorageType, vplsConfigSignalingType                       INTEGER}
vplsConfigIndex  OBJECT-TYPE
SYNTAX          Unsigned32 (1..2147483647)
MAX-ACCESS      not-accessible
STATUS          current
DESCRIPTION
 "Unique index for the conceptual row identifying
 a VPLS service."
 ::= { vplsConfigEntry 1 }

vplsConfigName  OBJECT-TYPE
SYNTAX          SnmpAdminString
MAX-ACCESS      read-create
STATUS          current
DESCRIPTION
 "A textual name of the VPLS.
 If there is no local name, or this object is
 otherwise not applicable, then this object MUST
 contain a zero-length octet string."
DEFVAL           { "" }
 ::= { vplsConfigEntry 2 }

vplsConfigDescr OBJECT-TYPE
SYNTAX          SnmpAdminString
MAX-ACCESS      read-create
STATUS          current
DESCRIPTION
 "A textual string containing information about the
 VPLS service. If there is no information for this VPLS
 service, then this object MUST contain a zero-length
 octet string."
DEFVAL           { "" }
 ::= { vplsConfigEntry 3 }

vplsConfigAdminStatus OBJECT-TYPE
SYNTAX          INTEGER {
   up(1),
   down(2),
   testing(3) -- in some test mode
}
MAX-ACCESS      read-create
STATUS          current
DESCRIPTION
 "The desired administrative state of the VPLS
 service. If the administrative status of the
 VPLS service is changed to enabled, then this

service is able to utilize pseudowires to perform the tasks of a VPLS service. The testing(3) state indicates that no operational packets can be passed."

DEFVAL                      { down }
 ::= { vplsConfigEntry 4 }

vplsConfigMacLearning OBJECT-TYPE
SYNTAX          TruthValue
MAX-ACCESS      read-create
STATUS          current
DESCRIPTION
 "This object specifies if MAC Learning is enabled in this service. If this object is true then MAC Learning is enabled. If false, then MAC Learning is disabled."

DEFVAL          { true }
 ::= { vplsConfigEntry 6 }

vplsConfigDiscardUnknownDest OBJECT-TYPE
SYNTAX          TruthValue
MAX-ACCESS      read-create
STATUS          current
DESCRIPTION
 "If the value of this object is 'true', then frames received with an unknown destination MAC are discarded in this VPLS. If 'false', then the packets are processed."

DEFVAL          { false }
 ::= { vplsConfigEntry 7 }

vplsConfigMacAging OBJECT-TYPE
SYNTAX          TruthValue
MAX-ACCESS      read-create
STATUS          current
DESCRIPTION
 "If the value of this object is 'true', then the MAC aging process is enabled in this VPLS. If 'false', then the MAC aging process is disabled."

DEFVAL          { true }
 ::= { vplsConfigEntry 8 }

vplsConfigFwdFullHighWatermark OBJECT-TYPE
SYNTAX          Unsigned32 (0..100)
UNITS           "percentage"
MAX-ACCESS      read-create
STATUS          current
DESCRIPTION
"This object specifies the utilization of the forwarding database for this VPLS instance at which the vplsFwdFullAlarmRaised notification will be sent. The value of this object must be higher than vplsConfigFwdFullLowWatermark."

DEFVAL { 95 }
::= { vplsConfigEntry 10 }

vplsConfigFwdFullLowWatermark OBJECT-TYPE
SYNTAX Unsigned32 (0..99)
UNITS "percentage"
MAX-ACCESS read-create
STATUS current
DESCRIPTION
"This object specifies the utilization of the forwarding database for this VPLS instance at which the vplsFwdFullAlarmCleared notification will be sent. The value of this object must be less than vplsConfigFwdFullHighWatermark."

DEFVAL { 90 }
::= { vplsConfigEntry 11 }

vplsConfigRowStatus OBJECT-TYPE
SYNTAX RowStatus
MAX-ACCESS read-create
STATUS current
DESCRIPTION
"For creating, modifying, and deleting this row. All other objects in this row must be set to valid values before this object can be set to active(1).

None of the read-create objects in the conceptual rows may be changed when this object is in the active(1) state.

If this object is set to destroy(6) or deleted by the agent, all associated entries in the vplsPwBindTable, vplsBgpRteTargetTable, and vplsBgpVETable shall be deleted."
::= { vplsConfigEntry 12 }

vplsConfigMtu OBJECT-TYPE
SYNTAX Unsigned32 (64..9192)
MAX-ACCESS read-create
STATUS current
DESCRIPTION "The value of this object specifies the MTU of this
VPLS instance. This can be used to limit the MTU to a
value lower than the MTU supported by the associated
pseudowires."
DEFVAL { 1518 }
 ::= { vplsConfigEntry 13 }

vplsConfigVpnId OBJECT-TYPE
SYNTAX VPNIdOrZero
MAX-ACCESS read-create
STATUS current
DESCRIPTION "This object indicates the IEEE 802-1990
VPN ID of the associated VPLS service."
 ::= { vplsConfigEntry 14 }

vplsConfigStorageType OBJECT-TYPE
SYNTAX StorageType
MAX-ACCESS read-create
STATUS current
DESCRIPTION "This variable indicates the storage type for this row."
DEFVAL { nonVolatile }
 ::= { vplsConfigEntry 15 }

vplsConfigSignalingType OBJECT-TYPE
SYNTAX INTEGER {
    ldp(1),
    bgp(2),
    none(3)
}
MAX-ACCESS read-create
STATUS current
DESCRIPTION "Desired signaling type of the VPLS service.
If the value of this object is ldp(1), then a
corresponding entry in vplsLdpConfigTable is required.
If the value of this object is bgp(2), then a
corresponding entry in vplsBgpConfigTable is required.
If the value of this object is none(3), then it
indicates a static configuration of PW labels."
DEFVAL { none }
::= { vplsConfigEntry 16 }

-- VPLS Status table

vplsStatusTable OBJECT-TYPE
SYNTAX        SEQUENCE OF VplsStatusEntry
MAX-ACCESS    not-accessible
STATUS        current
DESCRIPTION   "This table provides information for monitoring Virtual Private LAN Service (VPLS)."
::= { vplsObjects 3 }

vplsStatusEntry OBJECT-TYPE
SYNTAX        VplsStatusEntry
MAX-ACCESS    not-accessible
STATUS        current
DESCRIPTION   "A row in this table represents a Virtual Private LAN Service (VPLS) in a packet network. It is indexed by vplsConfigIndex, which uniquely identifies a single VPLS.

A row in this table is automatically created by the agent when a VPLS service is first set to active.
"  
AUGMENTS       { vplsConfigEntry }
::= { vplsStatusTable 1 }

VplsStatusEntry ::=  
SEQUENCE {
  vplsStatusOperStatus                        INTEGER,
  vplsStatusPeerCount                         Counter32
}

vplsStatusOperStatus OBJECT-TYPE
SYNTAX        INTEGER { 
                   other(0),
                   up(1),
                   down(2) }
MAX-ACCESS    read-only
STATUS        current
DESCRIPTION   "The current operational state of this VPLS service."
::= { vplsStatusEntry 1 }

vplsStatusPeerCount OBJECT-TYPE
SYNTAX     Counter32
MAX-ACCESS read-only
STATUS     current
DESCRIPTION
"This objects specifies the number of peers (pseudowires) present in this VPLS instance."
::= { vplsStatusEntry 2 }

-- VPLS PW Binding Table
vplsPwBindTable OBJECT-TYPE
SYNTAX     SEQUENCE OF VplsPwBindEntry
MAX-ACCESS not-accessible
STATUS     current
DESCRIPTION
"This table provides an association between a VPLS service and the corresponding pseudowires. A service can have more than one pseudowire association. Pseudowires are defined in the pwTable"
::= { vplsObjects 4 }

vplsPwBindEntry OBJECT-TYPE
SYNTAX     VplsPwBindEntry
MAX-ACCESS not-accessible
STATUS     current
DESCRIPTION
"Each row represents an association between a VPLS instance and a pseudowire defined in the pwTable. Each index is unique in describing an entry in this table. However, both indexes are required to define the one to many association of service to pseudowire. Entries in this table may be created or deleted through SNMP, as side effects of console or other non-SNMP management commands, or upon learning via autodiscovery.

It is optional for the agent to allow entries to be created that point to nonexistent entries in vplsConfigTable."
INDEX  { vplsConfigIndex, pwIndex }
::= { vplsPwBindTable 1 }

VplsPwBindEntry ::= SEQUENCE {


vplsPwBindConfigType INTEGER,
vplsPwBindType INTEGER,
vplsPwBindRowStatus RowStatus,
vplsPwBindStorageType StorageType
}

vplsPwBindConfigType OBJECT-TYPE
SYNTAX INTEGER {
   manual (1),
   autodiscovery (2)
}
MAX-ACCESS read-create
STATUS current
DESCRIPTION "The value of this object indicates whether the pseudowire Binding was created via SNMP/Console or via Auto-Discovery. The value of this object must be specified when the row is created and cannot be changed while the row status is active(1)"
::= { vplsPwBindEntry 1 }

vplsPwBindType OBJECT-TYPE
SYNTAX INTEGER {
   mesh (1),
   spoke (2)
}
MAX-ACCESS read-create
STATUS current
DESCRIPTION "The value of this object indicates whether the pseudowire Binding is of type mesh or spoke. The value of this object must be specified when the row is created and cannot be changed while the row status is active(1)"
::= { vplsPwBindEntry 2 }

vplsPwBindRowStatus OBJECT-TYPE
SYNTAX RowStatus
MAX-ACCESS read-create
STATUS current
DESCRIPTION "For creating, modifying, and deleting this row. All other objects in this row must be set to valid..."
values before this object can be set to active(1).

None of the read-create objects in the conceptual rows may be changed when this object is in the active(1) state.

If autodiscovered entries are deleted they would likely re-appear in the next autodiscovery interval.

 ::= { vplsPwBindEntry 3 }

vplsPwBindStorageType OBJECT-TYPE
SYNTAX StorageType
MAX-ACCESS read-create
STATUS current
DESCRIPTION "This variable indicates the storage type for this row."
DEFVAL { volatile }
 ::= { vplsPwBindEntry 4 }

-- vplsBgpADConfigTable

vplsBgpADConfigTable OBJECT-TYPE
SYNTAX SEQUENCE OF VplsBgpADConfigEntry
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION "This table specifies information for configuring BGP Auto-Discovery parameters for a given VPLS service."

 ::= { vplsObjects 5 }

vplsBgpADConfigEntry OBJECT-TYPE
SYNTAX VplsBgpADConfigEntry
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION "A row in this table indicates that BGP based Auto-Discovery is in use for this instance of VPLS. A row in this table is indexed by vplsConfigIndex, which uniquely identifies a single VPLS.

Entries in this table may be created or deleted through SNMP, as side effects of console or other non-SNMP management commands, or upon learning via autodiscovery.

All of the read-create objects can be changed when vplsBGPADConfigRowStatus is in active(1) state."
VplsBgpADConfigEntry ::= SEQUENCE {
  vplsBgpADConfigRouteDistinguisher  VplsBgpRouteDistinguisher,
  vplsBgpADConfigPrefix              Unsigned32,
  vplsBgpADConfigVplsId              VplsBgpRouteDistinguisher,
  vplsBgpADConfigRowStatus           RowStatus,
  vplsBgpADConfigStorageType         StorageType
}

vplsBgpADConfigRouteDistinguisher OBJECT-TYPE
SYNTAX          VplsBgpRouteDistinguisher
MAX-ACCESS      read-create
STATUS          current
DESCRIPTION "The route distinguisher for this VPLS. See RFC 4364 for a complete definition of a route distinguisher. For more details on use of a route distinguisher for a VPLS service, see RFC 4761. When not configured, the value is derived from the lower 6 bytes of vplsBgpADConfigVplsId."
::= { vplsBgpADConfigEntry 1 }

vplsBgpADConfigPrefix      OBJECT-TYPE
SYNTAX          Unsigned32
MAX-ACCESS      read-create
STATUS          current
DESCRIPTION "In case of auto-discovery, the default prefix advertised is the IP address of the loopback. In case the user wants to override the loopback address, vplsBgpADConfigPrefix should be set. When this value is non-zero, this value is used along with vplsBgpADConfigRouteDistinguisher in the Network Layer Reachability Information (NLRI), see RFC 6074."
DEFVAL { 0 }
::= { vplsBgpADConfigEntry 2 }

vplsBgpADConfigVplsId          OBJECT-TYPE
SYNTAX          VplsBgpRouteDistinguisher
MAX-ACCESS      read-create
STATUS          current
DESCRIPTION "VplsId is a unique identifier for all Virtual Switch Instances (VSIs) belonging to the same VPLS. It is
advertised as an extended community.

::= { vplsBgpADConfigEntry 3 }

vplsBgpADConfigRowStatus OBJECT-TYPE
SYNTAX RowStatus
MAX-ACCESS read-create
STATUS current
DESCRIPTION "For creating, modifying, and deleting this row.

All other objects in this row must be set to valid
values before this object can be set to active(1).

None of the read-create objects in the
conceptual rows may be changed when this
object is in the active(1) state."
::= { vplsBgpADConfigEntry 4 }

vplsBgpADConfigStorageType OBJECT-TYPE
SYNTAX StorageType
MAX-ACCESS read-create
STATUS current
DESCRIPTION "This variable indicates the storage type for this row."
DEFVAL { nonVolatile }
::= { vplsBgpADConfigEntry 5 }

-- vplsBgpRteTargetTable

vplsBgpRteTargetTable OBJECT-TYPE
SYNTAX SEQUENCE OF VplsBgpRteTargetEntry
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION "This table specifies the list of Route Targets
imported or exported by BGP during
auto-discovery of VPLS."

::= { vplsObjects 6 }

vplsBgpRteTargetEntry OBJECT-TYPE
SYNTAX VplsBgpRteTargetEntry
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION "An entry in this table specifies the value of the
Route Target being used by BGP. Depending on the value
of vplsBgpRteTargetType, a Route Target might be exported, imported, or both. Every VPLS that uses auto-discovery for finding peer nodes can import and export multiple Route Targets. This representation allows support for hierarchical VPLS.

Entries in this table may be created or deleted through SNMP, as side effects of console or other non-SNMP management commands, or upon learning via autodiscovery.

It is optional for the agent to allow entries to be created that point to nonexistent entries in vplsConfigTable.

INDEX     { vplsConfigIndex, vplsBgpRteTargetIndex }
::= { vplsBgpRteTargetTable 1 }

VplsBgpRteTargetEntry ::= SEQUENCE {
  vplsBgpRteTargetIndex          Unsigned32,
  vplsBgpRteTargetRTType         VplsBgpRouteTargetType,
  vplsBgpRteTargetRT             VplsBgpRouteTarget,
  vplsBgpRteTargetRowStatus      RowStatus,
  vplsBgpRteTargetStorageType    StorageType
}

vplsBgpRteTargetIndex   OBJECT-TYPE
SYNTAX          Unsigned32
MAX-ACCESS      not-accessible
STATUS          current
DESCRIPTION
"This index, along with vplsConfigIndex, identifies one entry in the vplsBgpRteTargetTable. By keeping vplsConfigIndex constant and using a new value of vplsBgpRteTargetIndex, users can configure multiple Route Targets for the same VPLS."
::= { vplsBgpRteTargetEntry 1 }

vplsBgpRteTargetRTType  OBJECT-TYPE
SYNTAX          VplsBgpRouteTargetType
MAX-ACCESS      read-create
STATUS          current
DESCRIPTION
"Used to define the type of a Route Target usage. Route Targets can be specified to be imported, exported, or both. For a complete definition of a Route Target, see RFC 4364."
::= { vplsBgpRteTargetEntry 2 }

vplsBgpRteTargetRT       OBJECT-TYPE
SYNTAX        VplsBgpRouteTarget
MAX-ACCESS    read-create
STATUS        current
DESCRIPTION
"The Route Target associated with the VPLS service.
For more details on use of Route Targets
for a VPLS service, see RFC 4761."
::= { vplsBgpRteTargetEntry 3 }

vplsBgpRteTargetRowStatus 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.

All other objects in this row must be set to valid
values before this object can be set to active(1).

When a row in this table is in active(1) state, no
objects in that row can be modified.

If autodiscovered entries are deleted they would
likely re-appear in the next autodiscovery interval."
::= { vplsBgpRteTargetEntry 4 }

vplsBgpRteTargetStorageType OBJECT-TYPE
SYNTAX        StorageType
MAX-ACCESS    read-create
STATUS        current
DESCRIPTION
"This variable indicates the storage type for this row."
DEFVAL { volatile }
::= { vplsBgpRteTargetEntry 5 }

vplsStatusNotifEnable OBJECT-TYPE
SYNTAX        TruthValue
MAX-ACCESS    read-write
STATUS        current
DESCRIPTION
"If this object is set to true(1), then it enables
the emission of a vplsStatusChanged
notification; otherwise, this notification is not
"See also RFC 3413 for explanation that notifications are under the ultimate control of the MIB module in this document."

DEFVAL { false }

::= { vplsObjects 7 }

vplsNotificationMaxRate OBJECT-TYPE
SYNTAX Unsigned32
MAX-ACCESS read-write
STATUS current
DESCRIPTION
"This object indicates the maximum number of notifications issued per second. If events occur more rapidly, the implementation may simply fail to emit these notifications during that period, or it may queue them until an appropriate time. A value of 0 means no throttling is applied and events may be notified at the rate at which they occur."

DEFVAL { 0 }

::= { vplsObjects 8 }

-- VPLS Service Notifications

vplsStatusChanged NOTIFICATION-TYPE
OBJECTS {
  vplsConfigVpnId,
  vplsConfigAdminStatus,
  vplsStatusOperStatus
}
STATUS current
DESCRIPTION
"The vplsStatusChanged notification is generated when there is a change in the administrative or operating status of a VPLS service. The object instances included in the notification are the ones associated with the VPLS service whose status has changed."

::= { vplsNotifications 1 }

vplsFwdFullAlarmRaised NOTIFICATION-TYPE
OBJECTS {
  vplsConfigVpnId,
  vplsConfigFwdFullHighWatermark,
  vplsConfigFwdFullLowWatermark
}
STATUS current
DESCRIPTION
"The vplsFwdFullAlarmRaised notification is
generated when the utilization of the Forwarding
database is above the value specified by
vplsConfigFwdFullHighWatermark.

The object instances included in the notification
are the ones associated with the VPLS service
that has exceeded the threshold."
::= { vplsNotifications 2 }

vplsFwdFullAlarmCleared NOTIFICATION-TYPE
OBJECTS {
  vplsConfigVpnId,
  vplsConfigFwdFullHighWatermark,
  vplsConfigFwdFullLowWatermark
}
STATUS current
DESCRIPTION
"The vplsFwdFullAlarmCleared notification is
generated when the utilization of the Forwarding
database is below the value specified by
vplsConfigFwdFullLowWatermark.

The object instances included in the notification
are the ones associated with the VPLS service
that has fallen below the threshold."
::= { vplsNotifications 3 }

-- Conformance Section

vplsCompliances
OBJECT IDENTIFIER ::= { vplsConformance 1 }
-- Compliance requirement for fully compliant implementations

vplsModuleFullCompliance MODULE-COMPLIANCE
STATUS current
DESCRIPTION
"Compliance requirement for implementations that
provide full support for VPLS-GENERIC-MIB.
Such devices can then be monitored and configured using
this MIB module."

MODULE -- this module

MANDATORY-GROUPS {
  vplsGroup,
  vplsPwBindGroup,
  vplsNotificationGroup
}
::= { vplsCompliances 1 }

-- Compliance requirement for read-only implementations.

vplsModuleReadOnlyCompliance MODULE-COMPLIANCE
STATUS current
DESCRIPTION
"Compliance requirement for implementations that only provide read-only support for VPLS-GENERIC-MIB. Such devices can then be monitored but cannot be configured using this MIB modules."

MODULE -- this module

MANDATORY-GROUPS {
  vplsGroup,
  vplsPwBindGroup,
  vplsNotificationGroup
}

OBJECT          vplsConfigName
MIN-ACCESS      read-only
DESCRIPTION
"Write access is not required."

OBJECT          vplsConfigDescr
MIN-ACCESS      read-only
DESCRIPTION
"Write access is not required."

OBJECT          vplsConfigAdminStatus
MIN-ACCESS      read-only
DESCRIPTION
"Write access is not required."

OBJECT          vplsConfigMacLearning
MIN-ACCESS      read-only
DESCRIPTION
"Write access is not required."

OBJECT          vplsConfigDiscardUnknownDest
MIN-ACCESS      read-only
DESCRIPTION
"Write access is not required."
OBJECT vplsConfigMacAging
MIN-ACCESS read-only
DESCRIPTION "Write access is not required."

OBJECT vplsConfigFwdFullHighWatermark
MIN-ACCESS read-only
DESCRIPTION "Write access is not required."

OBJECT vplsConfigFwdFullLowWatermark
MIN-ACCESS read-only
DESCRIPTION "Write access is not required."

OBJECT vplsConfigRowStatus
MIN-ACCESS read-only
DESCRIPTION "Write access is not required."

OBJECT vplsConfigMtu
MIN-ACCESS read-only
DESCRIPTION "Write access is not required."

OBJECT vplsPwBindConfigType
MIN-ACCESS read-only
DESCRIPTION "Write access is not required."

OBJECT vplsPwBindType
MIN-ACCESS read-only
DESCRIPTION "Write access is not required."

OBJECT vplsPwBindRowStatus
MIN-ACCESS read-only
DESCRIPTION "Write access is not required."

 ::= { vplsCompliances 2 }

-- Units of conformance.

vplsGroups
OBJECT IDENTIFIER ::= { vplsConformance 2 }

Nadeau, et al. Standards Track [Page 27]
vplsGroup OBJECT-GROUP

OBJECTS {
  vplsConfigName,
  vplsBgpADConfigRouteDistinguisher,
  vplsBgpRteTargetRTType,
  vplsBgpRteTargetRT,
  vplsBgpRteTargetRowStatus,
  vplsBgpRteTargetStorageType,
  vplsBgpADConfigPrefix,
  vplsBgpADConfigVplsId,
  vplsBgpADConfigRowStatus,
  vplsBgpADConfigStorageType,
  vplsConfigDescr,
  vplsConfigAdminStatus,
  vplsConfigMacLearning,
  vplsConfigDiscardUnknownDest,
  vplsConfigMacAging,
  vplsConfigVpnId,
  vplsConfigFwdFullHighWatermark,
  vplsConfigFwdFullLowWatermark,
  vplsConfigRowStatus,
  vplsConfigIndexNext,
  vplsConfigMtu,
  vplsConfigStorageType,
  vplsConfigSignalingType,
  vplsStatusOperStatus,
  vplsStatusPeerCount,
  vplsStatusNotifEnable,
  vplsNotificationMaxRate
}

STATUS current

DESCRIPTION
"The group of objects supporting management of L2VPN VPLS services"
::= { vplsGroups 1 }

vplsPwBindGroup OBJECT-GROUP

OBJECTS {
  vplsPwBindConfigType,
  vplsPwBindType,
  vplsPwBindRowStatus,
  vplsPwBindStorageType
}

STATUS current

DESCRIPTION
"The group of objects supporting management of pseudowire (PW) Binding to VPLS."
::= { vplsGroups 2 }

vplsNotificationGroup NOTIFICATION-GROUP
NOTIFICATIONS {
  vplsStatusChanged,
  vplsFwdFullAlarmRaised,
  vplsFwdFullAlarmCleared
}

STATUS current

DESCRIPTION
"The group of notifications supporting the Notifications generated for VPLS services."

::= { vplsGroups 3 }

END

6.2. VPLS-LDP-MIB Object Definitions

This MIB module mentions the following documents:
[RFC2578], [RFC2579], [RFC2580], [RFC5601], and [RFC4762].

VPLS-LDP-MIB DEFINITIONS ::= BEGIN

IMPORTS

MODULE-IDENTITY, OBJECT-TYPE, NOTIFICATION-TYPE,
Unsigned32, transmission
FROM SNMPv2-SMI                    -- RFC 2578

MODULE-COMPLIANCE, OBJECT-GROUP, NOTIFICATION-GROUP
FROM SNMPv2-CONF                   -- RFC 2580

TruthValue
FROM SNMPv2-TC                     -- RFC 2579

pwIndex, pwID
FROM PW-STD-MIB                    -- RFC 5601

vplsConfigIndex, vplsConfigName
FROM VPLS-GENERIC-MIB;

vplsLdpMIB MODULE-IDENTITY
LAST-UPDATED "201405191200Z"            -- 19 May 2014 12:00:00 GMT
ORGANIZATION "Layer 2 Virtual Private Networks (L2VPN)
Working Group"
CONTACT-INFO

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Email: romedira@cisco.com

The L2VPN Working Group
(email distribution l2vpn@ietf.org,
http://www.ietf.org/wg/l2vpn/charter/)
"

DESCRIPTION

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The initial version of this MIB module was published in RFC 7257; for full legal notices see the RFC itself.

This MIB module contains managed object definitions for LDP-signaled Virtual Private LAN Services as in RFC 4762.

This MIB module enables the use of any underlying pseudowire network."

-- Revision history.
REVISION
"201405191200Z" -- 19 May 2014 12:00:00 GMT

DESCRIPTION "Initial version published as part of RFC 7257.
::= { transmission 275 }

-- Top-level components of this MIB.
-- Notifications

vplsLdpNotifications OBJECT IDENTIFIER
 ::= { vplsLdpMIB 0 }

-- Tables, Scalars

vplsLdpObjects OBJECT IDENTIFIER
 ::= { vplsLdpMIB 1 }

-- Conformance

Nadeau, et al. Standards Track
vplsLdpConformance OBJECT IDENTIFIER ::= { vplsLdpMIB 2 }

vplsLdpConfigTable OBJECT-TYPE
SYNTAX SEQUENCE OF VplsLdpConfigEntry
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION "This table specifies information for configuring and monitoring LDP-specific parameters for Virtual Private LAN Service (VPLS)."
 ::= { vplsLdpObjects 1 }

vplsLdpConfigEntry OBJECT-TYPE
SYNTAX VplsLdpConfigEntry
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION "A row in this table represents LDP-specific information for Virtual Private LAN Service (VPLS) in a packet network. It is indexed by vplsConfigIndex, which uniquely identifies a single VPLS. A row is automatically created when a VPLS service is configured using LDP signaling. All of the writable objects values can be changed when vplsConfigRowStatus is in the active(1) state."
INDEX { vplsConfigIndex }
 ::= { vplsLdpConfigTable 1 }

VplsLdpConfigEntry ::= SEQUENCE {
 vplsLdpConfigMacAddrWithdraw TruthValue
 }

vplsLdpConfigMacAddrWithdraw OBJECT-TYPE
SYNTAX TruthValue
MAX-ACCESS read-write
STATUS current
DESCRIPTION "This object specifies if MAC address withdrawal is enabled in this service. If this object is 'true', then MAC address withdrawal is enabled. If 'false', then MAC address withdrawal is disabled."
DEFVAL { true }
::= { vplsLdpConfigEntry 1 }

-- VPLS LDP PW Binding Table

vplsLdpPwBindTable OBJECT-TYPE
SYNTAX          SEQUENCE OF VplsLdpPwBindEntry
MAX-ACCESS      not-accessible
STATUS          current
DESCRIPTION
   "This table provides LDP-specific information for an association between a VPLS service and the corresponding pseudowires. A service can have more than one pseudowire association. Pseudowires are defined in the pwTable."
::= { vplsLdpObjects 2 }

vplsLdpPwBindEntry OBJECT-TYPE
SYNTAX          VplsLdpPwBindEntry
MAX-ACCESS      not-accessible
STATUS          current
DESCRIPTION
   "Each row represents an association between a VPLS instance and one or more pseudowires defined in the pwTable. Each index is unique in describing an entry in this table. However, both indexes are required to define the one-to-many association of service to pseudowire.

   An entry in this table is instantiated only when LDP signaling is used to configure VPLS service.

   Each entry in this table provides LDP-specific information for the VPLS represented by vplsConfigIndex."
INDEX  { vplsConfigIndex, pwIndex }
::= { vplsLdpPwBindTable 1 }

VplsLdpPwBindEntry ::==
SEQUENCE {
    vplsLdpPwBindMacAddressLimit       Unsigned32
}

vplsLdpPwBindMacAddressLimit OBJECT-TYPE
SYNTAX          Unsigned32 (0..4294967295)
MAX-ACCESS      read-write
STATUS          current
DESCRIPTION
   "The value of this object specifies the maximum
number of learned and static entries allowed in the Forwarding database for this PW Binding. The value 0 means there is no limit for this PW Binding.

DEFVAL { 0 }
 ::= { vplsLdpPwBindEntry 1 }

-- VPLS LDP Service Notifications

vplsLdpPwBindMacTableFull NOTIFICATION-TYPE
OBJECTS {
   vplsConfigName,
   pwID
}
STATUS current
DESCRIPTION
"The vplsLdpPwBindMacTableFull notification is generated when the number of learned MAC addresses increases to the value specified in vplsLdpPwBindMacAddressLimit."
 ::= { vplsLdpNotifications 1 }

-- Conformance Section

vplsLdpCompliances
OBJECT IDENTIFIER ::= { vplsLdpConformance 1 }

-- Compliance requirement for fully compliant implementations

vplsLdpModuleFullCompliance MODULE-COMPLIANCE
STATUS current
DESCRIPTION
"Compliance requirement for implementations that provide full support for VPLS-LDP-MIB. Such devices can then be monitored and configured using this MIB module."

MODULE -- this module

MANDATORY-GROUPS {
   vplsLdpGroup,
   vplsLdpNotificationGroup
}
 ::= { vplsLdpCompliances 1 }

-- Compliance requirement for read-only implementations.

vplsLdpModuleReadOnlyCompliance MODULE-COMPLIANCE
STATUS current
DESCRIPTION
"Compliance requirement for implementations that only provide read-only support for VPLS-LDP-MIB.

Such devices can then be monitored but cannot be configured using this MIB modules."

MODULE -- this module

MANDATORY-GROUPS {
  vplsLdpGroup,
  vplsLdpNotificationGroup
}

OBJECT          vplsLdpConfigMacAddrWithdraw
MIN-ACCESS      read-only
DESCRIPTION      "Write access is not required."

OBJECT          vplsLdpPwBindMacAddressLimit
MIN-ACCESS      read-only
DESCRIPTION      "Write access is not required."

::= { vplsLdpCompliances 2 }

-- Units of conformance.

vplsLdpGroups
OBJECT IDENTIFIER ::= { vplsLdpConformance 2 }

vplsLdpGroup OBJECT-GROUP
OBJECTS {
  vplsLdpConfigMacAddrWithdraw,
  vplsLdpPwBindMacAddressLimit
}
STATUS          current
DESCRIPTION      "The group of objects supporting management of L2VPN VPLS services using LDP."
::= { vplsLdpGroups 1 }

vplsLdpNotificationGroup NOTIFICATION-GROUP
NOTIFICATIONS   {
  vplsLdpPwBindMacTableFull
}

Nadeau, et al. Standards Track [Page 34]
STATUS current
DESCRIPTION "The group of notifications supporting the Notifications generated for VPLS LDP Service."
 ::= { vplsLdpGroups 2 }
The initial version of this MIB module was published in RFC 7257; for full legal notices see the RFC itself.

This MIB module contains managed object definitions for BGP signaled Virtual Private LAN Service as in RFC 4761.

This MIB module enables the use of any underlying pseudowire network."

-- Revision history.
REVISION
"201405191200Z" -- 19 May 2014 12:00:00 GMT

DESCRIPTION "Initial version published as part of RFC 7257."
 ::= { transmission 276 }

-- Top-level components of this MIB.

-- Tables, Scalars
vplsBgpObjects OBJECT IDENTIFIER
 ::= { vplsBgpMIB 1 }

-- Conformance
vplsBgpConformance OBJECT IDENTIFIER
 ::= { vplsBgpMIB 2 }

-- Vpls Bgp Config Table

vplsBgpConfigTable OBJECT-TYPE
SYNTAX SEQUENCE OF VplsBgpConfigEntry
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
"This table specifies information for configuring and monitoring BGP-specific parameters for Virtual Private LAN Service (VPLS)."

::= { vplsBgpObjects 1 }

vplsBgpConfigEntry OBJECT-TYPE
SYNTAX VplsBgpConfigEntry
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION "A row in this table represents BGP-specific information for Virtual Private LAN Service (VPLS) in a packet network. It is indexed by vplsConfigIndex, which uniquely identifies a single instance of a VPLS service. A row is automatically created when a VPLS service is created that is configured to use BGP signaling. All of the writable object values can be changed when vplsConfigRowStatus is in the active(1) state."

INDEX { vplsConfigIndex }
 ::= { vplsBgpConfigTable 1 }

VplsBgpConfigEntry ::= SEQUENCE {
  vplsBgpConfigVERangeSize Unsigned32
}

vplsBgpConfigVERangeSize OBJECT-TYPE
SYNTAX Unsigned32 (0..65535)
MAX-ACCESS read-write
STATUS current
DESCRIPTION "Specifies the size of the range of VPLS Edge Identifier (VE ID) in this VPLS service. This number controls the size of the label block advertised for this VE by the PE. A value of 0 indicates that the range is not configured and the PE derives the range value from received advertisements from other PEs. The VE ID takes 2 octets in VPLS BGP NLRI according to RFC 4761. Hence we have limited the range of this object to 65535."

DEFVAL { 0 }
 ::= { vplsBgpConfigEntry 1 }

-- Vpl Edge Device (VE) Identifier Table

vplsBgpVETable OBJECT-TYPE
SYNTAX        SEQUENCE OF VplsBgpVEEntry
MAX-ACCESS    not-accessible
STATUS        current
DESCRIPTION   "This table associates VPLS Edge devices to a VPLS service"
 ::= { vplsBgpObjects 2 }

vplsBgpVEEntry OBJECT-TYPE
SYNTAX        VplsBgpVEEntry
MAX-ACCESS    not-accessible
STATUS        current
DESCRIPTION   "An entry in this table is created for each VE ID
configured on a PE for a particular VPLS service instance.

Entries in this table may be created or deleted
through SNMP, as side effects of console or other
non-SNMP management commands, or upon learning via
autodiscovery.

It is optional for the agent to allow entries to be
created that point to nonexistent entries in
vplsConfigTable."
INDEX  { vplsConfigIndex, vplsBgpVEId }
 ::= { vplsBgpVETable 1 }

VplsBgpVEEntry ::= SEQUENCE {
  vplsBgpVEId          Unsigned32,
  vplsBgpVEName        SnmpAdminString,
  vplsBgpVEPreference  Unsigned32,
  vplsBgpVERowStatus   RowStatus,
  vplsBgpVEStorageType StorageType
}

vplsBgpVEId OBJECT-TYPE
SYNTAX        Unsigned32 (1..65535)
MAX-ACCESS    not-accessible
STATUS        current
DESCRIPTION   "A secondary index identifying a VE within an
instance of a VPLS service.
The VE ID takes 2 octets in VPLS BGP NLRI according to RFC 4761. Hence, we have limited the range of this object to 65535.

::= { vplsBgpVEEntry 1 }

vplsBgpVEName OBJECT-TYPE
SYNTAX SnmpAdminString
MAX-ACCESS read-create
STATUS current
DESCRIPTION "Descriptive name for the site or user-facing PE (U-PE) associated with this VE ID."
DEFVAL { "" }
 ::= { vplsBgpVEEntry 2 }

vplsBgpVEPreference OBJECT-TYPE
SYNTAX Unsigned32 (0..65535)
MAX-ACCESS read-create
STATUS current
DESCRIPTION "Specifies the preference of the VE ID on this Provider Edge (PE) if the site is multihomed and VE ID is reused."
DEFVAL { 0 }
 ::= { vplsBgpVEEntry 3 }

vplsBgpVERowStatus 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.

All other objects in this row must be set to valid values before this object can be set to active(1).

When a row in this table is in active(1) state, no objects in that row can be modified except vplsBgpSiteRowStatus."
 ::= { vplsBgpVEEntry 5 }

vplsBgpVEStorageType OBJECT-TYPE
SYNTAX StorageType
MAX-ACCESS read-create
STATUS current
DESCRIPTION "This variable indicates the storage type for this
row.
DEFVAL { volatile }
::= { vplsBgpVEEntry 6 }

-- VPLS BGP PW Binding Table

vplsBgpPwBindTable OBJECT-TYPE
SYNTAX SEQUENCE OF VplsBgpPwBindEntry
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
"This table provides BGP-specific information for an association between a VPLS service and the corresponding pseudowires. A service can have more than one pseudowire association. Pseudowires are defined in the pwTable."
::= { vplsBgpObjects 3 }

vplsBgpPwBindEntry OBJECT-TYPE
SYNTAX VplsBgpPwBindEntry
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
"Each row represents an association between a VPLS instance and one or more pseudowires defined in the pwTable. Each index is unique in describing an entry in this table. However, both indexes are required to define the one to many association of service to pseudowire.

An entry in this table is instantiated only when BGP signaling is used to configure VPLS service.

Each entry in this table provides BGP-specific information for the VPLS represented by vplsConfigIndex."
INDEX { vplsConfigIndex, pwIndex }
::= { vplsBgpPwBindTable 1 }

VplsBgpPwBindEntry ::= SEQUENCE {
  vplsBgpPwBindLocalVEId Unsigned32,
  vplsBgpPwBindRemoteVEId Unsigned32
}

vplsBgpPwBindLocalVEId OBJECT-TYPE
SYNTAX Unsigned32 (1..65535)
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"Identifies the local VE with which this pseudowire is associated.

The VE ID takes 2 octets in VPLS BGP NLRI according to RFC 4761. Hence, we have limited the range of this object to 65535."
::= { vplsBgpPwBindEntry 1 }

vplsBgpPwBindRemoteVEId OBJECT-TYPE
SYNTAX Unsigned32 (1..65535)
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"Identifies the remote VE with which this pseudowire is associated.

The VE ID takes 2 octets in VPLS BGP NLRI according to RFC 4761. Hence, we have limited the range of this object to 65535."
::= { vplsBgpPwBindEntry 2 }

-- Conformance Section

-- Compliance requirement for fully compliant implementations

vplsBgpCompliances
OBJECT IDENTIFIER ::= { vplsBgpConformance 1 }

vplsBgpModuleFullCompliance MODULE-COMPLIANCE
STATUS current
DESCRIPTION
"Compliance requirement for implementations that provide full support for VPLS-BGP-MIB.

Such devices can then be monitored and configured using this MIB module."

MODULE -- this module

MANDATORY-GROUPS {
  vplsBgpConfigGroup,
  vplsBgpVEGroup,
  vplsBgpPwBindGroup
}
::= { vplsBgpCompliances 1 }

-- Compliance requirement for read-only implementations.
vplsBgpModuleReadOnlyCompliance MODULE-COMPLIANCE
STATUS current
DESCRIPTION
"Compliance requirement for implementations that only
provide read-only support for VPLS-BGP-MIB.
Such devices can then be monitored but cannot be
configured using this MIB modules."

MODULE -- this module

MANDATORY-GROUPS {
  vplsBgpConfigGroup,
  vplsBgpVEGroup,
  vplsBgpPwBindGroup
}

OBJECT vplsBgpConfigVERangeSize
MIN-ACCESS read-only
DESCRIPTION
"Write access is not required."

OBJECT vplsBgpVEName
MIN-ACCESS read-only
DESCRIPTION
"Write access is not required."

OBJECT vplsBgpVEPreference
MIN-ACCESS read-only
DESCRIPTION
"Write access is not required."

OBJECT vplsBgpVERowStatus
MIN-ACCESS read-only
DESCRIPTION
"Write access is not required."

::= { vplsBgpCompliances 2 }

-- Units of conformance.

vplsBgpGroups

OBJECT IDENTIFIER ::= { vplsBgpConformance 2 }

vplsBgpConfigGroup OBJECT-GROUP
OBJECTS {
  vplsBgpConfigVERangeSize
}
STATUS          current
DESCRIPTION       "The group of objects supporting configuration
of L2VPN VPLS services using BGP."
::= { vplsBgpGroups 1 }

vplsBgpVEGroup OBJECT-GROUP
OBJECTS {
  vplsBgpVEName,
  vplsBgpVEPreference,
  vplsBgpVERowStatus,
  vplsBgpVEStorageType
}
STATUS          current
DESCRIPTION       "The group of objects supporting management of VPLS
Edge devices for L2VPN VPLS services using BGP."
::= { vplsBgpGroups 2 }

vplsBgpPwBindGroup OBJECT-GROUP
OBJECTS {
  vplsBgpPwBindLocalVEId,
  vplsBgpPwBindRemoteVEId
}
STATUS          current
DESCRIPTION       "The group of objects supporting management of
pseudowires for L2VPN VPLS services using BGP."
::= { vplsBgpGroups 3 }

END
7. 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 their sensitivity/vulnerability:

- **vplsConfigTable:**
- **vplsPwBindTable:**
- **vplsBgpADConfigTable:**
- **vplsBgpRteTargetTable:**
- **vplsLdpPwBindTable:**
- **vplsLdpConfigTable:**
- **vplsBgpConfigTable:**
- **vplsBgpVETable:**

The tables listed above contain read-create/read-write objects that can be used to configure or modify a LDP/BGP VPLS service. Any improper configuration or modification of objects in these tables can disrupt VPLS services.

The use of stronger mechanisms such as SNMPv3 security should be considered where possible for configuring these objects. Specifically, SNMPv3 View-based Access Control Model (VACM) and User-based Security Model (USM) MUST be used with any v3 agent that provides SET access to these tables.

- **vplsNotificationMaxRate**
  
  Setting this object to a very high value can cause a notification storm that may disrupt network service.

Most 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 readable objects are contained in the following tables:

- **vplsConfigTable**
- **vplsStatusTable**
- **vplsPwBindTable**
- **vplsBgpADConfigTable**
- **vplsBgpRteTargetTable**
- **vplsLdpPwBindTable**
SNMP versions prior to SNMPv3 did not include adequate security. Even if the network itself is secure (for example by using IPsec), 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.

Implementations SHOULD provide the security features described by the SNMPv3 framework (see [RFC3410]), and implementations claiming compliance to the SNMPv3 standard MUST include full support for authentication and privacy via the User-based Security Model (USM) [RFC3414] with the AES cipher algorithm [RFC3826]. Implementations MAY also provide support for the Transport Security Model (TSM) [RFC5591] in combination with a secure transport such as SSH [RFC5592] or TLS/DTLS [RFC6353].

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.

8. IANA Considerations

The MIB modules in this document use the following IANA-assigned OBJECT IDENTIFIER values recorded in the SMI Numbers registry.

8.1. IANA Considerations for VPLS-GENERIC-MIB

The IANA has assigned \{ transmission 274 \} to the VPLS-GENERIC-MIB module specified in this document.

8.2. IANA Considerations for VPLS-LDP-MIB

The IANA has assigned \{ transmission 275 \} to the VPLS-LDP-MIB module specified in this document.

8.3. IANA Considerations for VPLS-BGP-MIB

The IANA has assigned \{ transmission 276 \} to the VPLS-BGP-MIB module specified in this document.
9. References

9.1. Normative References


9.2. Informative References


10. Acknowledgments

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