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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.

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1. Introduction

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.

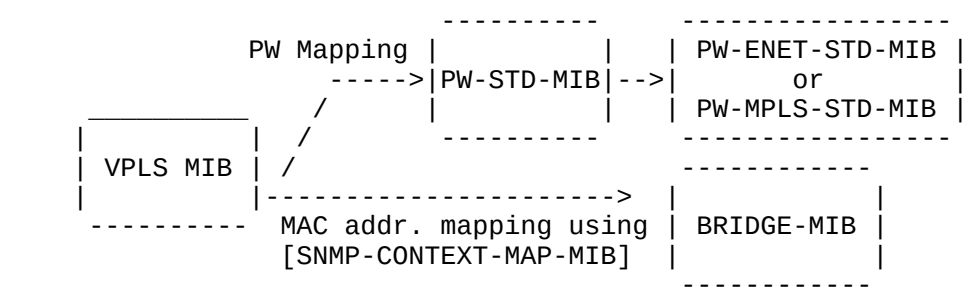

Figure 1

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"
   CONTACT-INFO
       "
        Thomas D. Nadeau
        Email:  tnadeau@lucidvison.com

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

```
    DESCRIPTION
          "Copyright (c) 2014 IETF Trust and the persons
           identified as authors of the code.  All rights reserved.

           Redistribution and use in source and binary forms, with
           or without modification, is permitted pursuant to, and
           subject to the license terms contained in, the Simplified
           BSD License set forth in Section 4.c of the IETF Trust's
           Legal Provisions Relating to IETF Documents
           (http://trustee.ietf.org/license-info).

           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 objects 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."
```

```
        INDEX      { vplsConfigIndex }
        ::= { vplsBgpADConfigTable 1 }

   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
```

```
            emitted."
          REFERENCE
          "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 }
```

```
   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
          "
           Rohit Mediratta
           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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           (http://trustee.ietf.org/license-info).

           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
```

```
   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 in 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

        }
```

```
        STATUS          current
        DESCRIPTION
             "The group of notifications supporting
              the  Notifications generated for
              VPLS LDP Service."
        ::= { vplsLdpGroups 2 }

   END
```

6.3. VPLS-BGP-MIB Object Definitions

This MIB module mentions the following documents: [RFC2578], [RFC2579], [RFC2580], [RFC3411], [RFC5601], and [RFC4761].

```
   VPLS-BGP-MIB DEFINITIONS ::= BEGIN

   IMPORTS

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

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

   RowStatus, StorageType
      FROM SNMPv2-TC                     -- RFC 2579

   SnmpAdminString
      FROM SNMP-FRAMEWORK-MIB            -- RFC 3411

   pwIndex
      FROM PW-STD-MIB                    -- RFC 5601

   vplsConfigIndex
      FROM VPLS-GENERIC-MIB
   ;

   vplsBgpMIB MODULE-IDENTITY
      LAST-UPDATED "201405191200Z"  -- 19 May 2014 12:00:00 GMT

      ORGANIZATION "Layer 2 Virtual Private Networks (L2VPN)
                                Working Group"
      CONTACT-INFO
          "
           V. J. Shah
           Email: vshah@juniper.net
```

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

        DESCRIPTION
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            identified as authors of the code.  All rights reserved.

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            BSD License set forth in Section 4.c of the IETF Trust's
            Legal Provisions Relating to IETF Documents
            (http://trustee.ietf.org/license-info).

            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 }

    -- Vpls 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 in 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

- o vplsLdpConfigTable
- o vplsBgpConfigTable
- o vplsBgpVETable
- o vplsBgpPwBindTable

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

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