如何使用SNMP在Catalyst上新增、修改和移除VLAN

目錄

簡介

本文說明如何在使用簡易網路管理通訊協定(SNMP)的Cisco Catalyst交換器上建立和刪除VLAN。其中也說明如何使用SNMP將連線埠新增到VLAN。

必要條件

需求

使用本檔案中的資訊之前，請確保您已瞭解：

- ifTable和ifIndexes的工作原理
- VLAN在Cisco Catalyst交換機上的工作方式
- 如何檢視Cisco Catalyst交換機上的VLAN資訊
- SNMP **get**、**set**和**walk**命令的一般用法

元件

本文檔適用於運行支援IF-MIB、CISCO-VTP-MIB和CISCO-VLAN-MEMBERSHIP-MIB的常規

Catalyst OS或Catalyst IOS的Catalyst交換機。本文中的資訊係根據以下軟體和硬體版本：

- 執行CatIOS 12.0(5)WC5a的Catalyst 3524XL
- NET-SNMP版本5.0.6，網址為http://www.net-snmp.org/ ⧉

本文中的資訊是根據特定實驗室環境內的裝置所建立。文中使用到的所有裝置皆從已清除（預設）的組態來啟動。如果您正在即時網路中工作，在使用任何命令之前，請確保您瞭解任何命令的潛在影響。

慣例

如需文件慣例的詳細資訊，請參閱思科技術提示慣例。

背景

MIB變數的詳細資訊 — 包括對象識別符號(OID)

```
1.3.6.1.4.1.9.9.46.1.3.1.1.2 (CISCO-VTP-MIB)
vtpVlanState   OBJECT-TYPE
    SYNTAX     INTEGER { operational(1),
                         suspended(2),
                         mtuTooBigForDevice(3),
                         mtuTooBigForTrunk(4) }
    MAX-ACCESS read-only
    STATUS     current
    DESCRIPTION           "The state of this VLAN.

          The state 'mtuTooBigForDevice' indicates that this device
          cannot participate in this VLAN because the VLAN's MTU is
          larger than the device can support.

          The state 'mtuTooBigForTrunk' indicates that while this
          VLAN's MTU is supported by this device, it is too large for
          one or more of the device's trunk ports."
    ::= { vtpVlanEntry 2 }


1.3.6.1.4.1.9.9.46.1.4.1.1.1 (CISCO-VTP-MIB)
vtpVlanEditOperation OBJECT-TYPE
    SYNTAX     INTEGER { none(1),
                         copy(2),
                         apply(3),
                         release(4),
                         restartTimer(5)
                       }
    MAX-ACCESS read-create
    STATUS     current
    DESCRIPTION           "This object always has the value 'none' when read.  When
          written, each value causes the appropriate action:

           'copy' - causes the creation of rows in the
          vtpVlanEditTable exactly corresponding to the current global
          VLAN information for this management domain.  If the Edit
          Buffer (for this management domain) is not currently empty,
          a copy operation fails.  A successful copy operation starts
          the deadman-timer.
```

'apply' - first performs a consistent check on the the
            modified information contained in the Edit Buffer, and if
            consistent, then tries to instanciate the modified
            information as the new global VLAN information. Note that
            an empty Edit Buffer (for the management domain) would
            always result in an inconsistency since the default VLANs
            are required to be present.

                 'release' - flushes the Edit Buffer (for this management
            domain), clears the Owner information, and aborts the
            deadman-timer. A release is generated automatically if the
            deadman-timer ever expires.

                 'restartTimer' - restarts the deadman-timer.

                 'none' - no operation is performed."
        ::= { vtpEditControlEntry 1 }

1.3.6.1.4.1.9.9.46.1.4.1.1.3 (CISCO-VTP-MIB)
vtpVlanEditBufferOwner OBJECT-TYPE
    SYNTAX   OwnerString
    MAX-ACCESS read-create
    STATUS   current
    DESCRIPTION   "The management station which is currently using the Edit
            Buffer for this management domain. When the Edit Buffer for
            a management domain is not currently in use, the value of
            this object is the zero-length string. Note that it is also
            the zero-length string if a manager fails to set this object
            when invoking a copy operation."
        ::= { vtpEditControlEntry 3 }

1.3.6.1.4.1.9.9.46.1.4.2.1.11 (CISCO-VTP-MIB)
vtpVlanEditRowStatus OBJECT-TYPE
    SYNTAX   RowStatus
1:active
2:notInService
3:notReady
4:createAndGo
5:createAndWait
6:destroy
    MAX-ACCESS read-create
    STATUS   current
    DESCRIPTION   "The status of this row. Any and all columnar objects in an
            existing row can be modified irrespective of the status of
            the row.

            A row is not qualified for activation until instances of at
            least its vtpVlanEditType, vtpVlanEditName and
            vtpVlanEditDot10Said columns have appropriate values.

            The management station should endeavor to make all rows
            consistent in the table before 'apply'ing the buffer. An
            inconsistent entry in the table will cause the entire
            buffer to be rejected with the vtpVlanApplyStatus object
            set to the appropriate error value."
        ::= { vtpVlanEditEntry 11 }

1.3.6.1.4.1.9.9.46.1.4.2.1.3.1.48 (CISCO-VTP-MIB)
vtpVlanEditType OBJECT-TYPE
    SYNTAX   VlanType
    MAX-ACCESS read-create

```
    STATUS      current
    DESCRIPTION             "The type which this VLAN would have.
          An implementation may restrict access to this object."
    DEFVAL     { ethernet }
    ::= { vtpVlanEditEntry 3 }


1.3.6.1.4.1.9.9.46.1.4.2.1.4.1.48 (CISCO-VTP-MIB)
vtpVlanEditName OBJECT-TYPE
    SYNTAX     DisplayString (SIZE (1..32))
    MAX-ACCESS read-create
    STATUS      current
    DESCRIPTION             "The name which this VLAN would have.  This name would be
          used as the ELAN-name for an ATM LAN-Emulation segment of
          this VLAN.

          An implementation may restrict access to this object."
    ::= { vtpVlanEditEntry 4 }


1.3.6.1.4.1.9.9.46.1.4.2.1.6.1.48 (CISCO-VTP-MIB)
vtpVlanEditDot10Said OBJECT-TYPE
    SYNTAX     OCTET STRING (SIZE (4))
    MAX-ACCESS read-create
    STATUS      current
    DESCRIPTION             "The value of the 802.10 SAID field which would be used for
          this VLAN.

          An implementation may restrict access to this object."
    ::= { vtpVlanEditEntry 6 }


1.3.6.1.4.1.9.9.46.1.4.1.1.2.1 (CISCO-VTP-MIB)
vtpVlanApplyStatus OBJECT-TYPE
    SYNTAX       INTEGER { inProgress(1),
                          succeeded(2),
                          configNumberError(3),
                          inconsistentEdit(4),
                          tooBig(5),
                          localNVStoreFail(6),
                          remoteNVStoreFail(7),
                          editBufferEmpty(8),
                          someOtherError(9)
                        }
    MAX-ACCESS read-only
    STATUS      current
    DESCRIPTION             "The current status of an 'apply' operation to instanciate
          the Edit Buffer as the new global VLAN information (for this
          management domain).  If no apply is currently active, the
          status represented is that of the most recently completed
          apply.  The possible values are:

             inProgress - 'apply' operation in progress;

             succeeded - the 'apply' was successful (this value is
                    also used when no apply has been invoked since the
                    last time the local system restarted);

             configNumberError - the apply failed because the value of
                    vtpVlanEditConfigRevNumber was less or equal to
                    the value of current value of
                    managementDomainConfigRevNumber;

             inconsistentEdit - the apply failed because the modified
```

```
                    information was not self-consistent;

            tooBig - the apply failed because the modified
                    information was too large to fit in this VTP
                    Server's non-volatile storage location;

            localNVStoreFail - the apply failed in trying to store
                    the new information in a local non-volatile
                    storage location;

            remoteNVStoreFail - the apply failed in trying to store
                    the new information in a remote non-volatile
                    storage location;

            editBufferEmpty - the apply failed because the Edit
                    Buffer was empty (for this management domain).

            someOtherError - the apply failed for some other reason
                    (e.g., insufficient memory)."
       ::= { vtpEditControlEntry 2 }
```

```
1.3.6.1.4.1.9.9.68.1.2.2.1.2 (CISCO-VLAN-MEMBERSHIP-MIB)
vmVlan  OBJECT-TYPE
        SYNTAX     INTEGER(0..4095)
        MAX-ACCESS read-write
        STATUS     current
        DESCRIPTION             "The VLAN id of the VLAN the port is assigned to
                when vmVlanType is set to static or dynamic.
                This object is not instantiated if not applicable.

                The value may be 0 if the port is not assigned
                to a VLAN.

                If vmVlanType is static, the port is always
                assigned to a VLAN and the object may not be
                set to 0.

                If vmVlanType is dynamic the object's value is
                0 if the port is currently not assigned to a VLAN.
                In addition, the object may be set to 0 only."
       ::= { vmMembershipEntry 2 }
```

使用SNMP將VLAN新增到Cisco Catalyst交換機

逐步說明

在以下範例中，VLAN 11新增到交換器：

1. 若要檢查交換器上目前設定的VLAN，請在**vtpVlanState** OID上發出**snmpwalk**:**註：**OID中的最後一個數字是VLAN編號。

   ```
   snmpwalk -c public crumpy vtpVlanState
   cisco.ciscoMgmt.ciscoVtpMIB.vtpMIBObjects.vlanInfo.vtpVlanTable.vtpVlanEntry.vtpVlanState.1
   .1 : INTEGER: operational
   cisco.ciscoMgmt.ciscoVtpMIB.vtpMIBObjects.vlanInfo.vtpVlanTable.vtpVlanEntry.vtpVlanState.1
   .48 : INTEGER: operational
   cisco.ciscoMgmt.ciscoVtpMIB.vtpMIBObjects.vlanInfo.vtpVlanTable.vtpVlanEntry.vtpVlanState.1
   .1002 : INTEGER: operational
   ```

2. 驗證版本是否正由另一個NMS工作站或裝置使用。如果看到以下消息，則版本未使用：MIB:

```
snmpwalk -c public crumpy vtpVlanEditTable
no MIB objects contained under subtree.
```

3. 該版本未使用，因此可以安全地開始編輯。將vtpVlanEditOperation設定為複製狀態（整數2）。 這麼做可建立VLAN。

```
snmpset -c private crumpy vtpVlanEditOperation.1 integer 2
cisco.ciscoMgmt.ciscoVtpMIB.vtpMIBObjects.vlanEdit.vtpEditControlTable.vtpEditControlEntry.
vtpVlanEditOperation.1 : INTEGER: copy
```

4. 若要使編輯許可權的當前所有者可見，可以在發出命令vtpVlanEditBufferOwner時設定所有者。

```
snmpset -c private crumpy vtpVlanEditBufferOwner.1 octetstring "Gerald"
cisco.ciscoMgmt.ciscoVtpMIB.vtpMIBObjects.vlanEdit.vtpEditControlTable.vtpEditControlEntry.
vtpVlanEditBufferOwner.1 : OCTET STRING- (ascii):    Gerald
```

5. 此示例說明如何驗證該表是否存在：

```
snmpwalk -c public crumpy vtpVlanEditTable
vtpVlanEditState.1.1 : INTEGER: operational
vtpVlanEditState.1.2 : INTEGER: operational
vtpVlanEditState.1.3 : INTEGER: operational
..
```

6. 以下示例是VLAN 11，說明如何建立行並設定型別和名稱：

```
snmpset -c private crumpy vtpVlanEditRowStatus.1.11 integer 4
cisco.ciscoMgmt.ciscoVtpMIB.vtpMIBObjects.vlanEdit.vtpVlanEditTable.vtpVlanEditEntry.vtpVla
nEditRowStatus.1.11 : INTEGER: createAndGo

snmpset -c private crumpy vtpVlanEditType.1.11 integer 1
cisco.ciscoMgmt.ciscoVtpMIB.vtpMIBObjects.vlanEdit.vtpVlanEditTable.vtpVlanEditEntry.vtpVla
nEditType.1.11 : INTEGER: ethernet

snmpset -c private crumpy vtpVlanEditName.1.11 octetstring "test_11_gerald"
cisco.ciscoMgmt.ciscoVtpMIB.vtpMIBObjects.vlanEdit.vtpVlanEditTable.vtpVlanEditEntry.vtpVla
nEditName.1.11 : DISPLAY STRING- (ascii):  test_11_gerald
```

7. 設定vtpVlanEditDot10Said。這是VLAN編號+ 100000轉換為十六進位制。此示例建立VLAN 11，因此vtpVlanEditDot10Said應為：11 + 100000 = 100011 ->十六進位制：000186AB

```
snmpset -c private crumpy vtpVlanEditDot10Said.1.11 octetstringhex 000186AB
cisco.ciscoMgmt.ciscoVtpMIB.vtpMIBObjects.vlanEdit.vtpVlanEditTable.vtpVlanEdi
ntry.vtpVlanEditDot10Said.1.11 : OCTET STRING-   (hex): length = 4
    0:  00 01 86 ab -- -- -- -- -- -- -- -- -- -- -- --    ................
```

8. 建立VLAN 11後，必須應用修改。再次使用vtpVlanEditOperation OID。這一次，請使用Apply確認設定：

```
snmpset -c private crumpy vtpVlanEditOperation.1 integer 3
cisco.ciscoMgmt.ciscoVtpMIB.vtpMIBObjects.vlanEdit.vtpEditControlTable.vtpEditControlEntry.
vtpVlanEditOperation.1 : INTEGER: apply
```

9. 驗證是否已成功建立VLAN。使用OID vtpVlanApplyStatus。檢查進程，直到狀態顯示為：：

```
snmpget -c public crumpy vtpVlanApplyStatus.1
vtpVlanApplyStatus.1 : INTEGER: inProgress
snmpget -c public crumpy vtpVlanApplyStatus.1
vtpVlanApplyStatus.1 : INTEGER: inProgress
```

```
snmpget -c public crumpy vtpVlanApplyStatus.1
vtpVlanApplyStatus.1 : INTEGER: succeeded
```

10. 最後一個操作是提交修改並釋放許可權，以便其他使用者可以從其NMS中新增、修改或刪除VLAN。
```
snmpset  -c private crumpy vtpVlanEditOperation.1 integer 4
vtpVlanEditOperation.1 : INTEGER: release
```

11. 驗證緩衝區是否為空：
```
snmpwalk -c public crumpy vtpVlanEditTable
no MIB objects contained under subtree.
```

12. 使用CLI指令show vlan 或使用snmpwalk確認交換器上已建立VLAN 11:
```
snmpwalk -c public crumpy vtpVlanState
cisco.ciscoMgmt.ciscoVtpMIB.vtpMIBObjects.vlanInfo.vtpVlanTable.vtpVlanEntry.vtpVlanState.
1.1 : INTEGER: operational
cisco.ciscoMgmt.ciscoVtpMIB.vtpMIBObjects.vlanInfo.vtpVlanTable.vtpVlanEntry.vtpVlanState.
1.11 : INTEGER: operational
cisco.ciscoMgmt.ciscoVtpMIB.vtpMIBObjects.vlanInfo.vtpVlanTable.vtpVlanEntry.vtpVlanState.
1.48 : INTEGER: operational
cisco.ciscoMgmt.ciscoVtpMIB.vtpMIBObjects.vlanInfo.vtpVlanTable.vtpVlanEntry.vtpVlanState.
1.1002 : INTEGER: operational
…
```

使用SNMP將VLAN新增到Cisco Catalyst交換機

一步說明

一步過程使用OID號而不是像前面的逐步過程那樣使用OID名稱。請參閱MIB詳細資訊進行轉換。此範例建立VLAN 6:

```
snmpset -c private crumpy 1.3.6.1.4.1.9.9.46.1.4.1.1.1.1 integer 2
1.3.6.1.4.1.9.9.46.1.4.1.1.3.1 octetstring "gcober"

snmpset -c private gooroo 1.3.6.1.4.1.9.9.46.1.4.2.1.11.1.6 integer 4
1.3.6.1.4.1.9.9.46.1.4.2.1.3.1.6 integer 1 1.3.6.1.4.1.9.9.46.1.4.2.1.4.1.6 octetstring "vlan6"
1.3.6.1.4.1.9.9.46.1.4.2.1.6.1.6 octetstringhex 000186A6 1.3.6.1.4.1.9.9.46.1.4.1.1.1.1 integer
3

snmpset -c private gooroo 1.3.6.1.4.1.9.9.46.1.4.1.1.1.1 integer 4

snmpwalk -c public crumpy 1.3.6.1.4.1.9.9.46.1.3.1.1.2
cisco.ciscoMgmt.ciscoVtpMIB.vtpMIBObjects.vlanInfo.vtpVlanTable.vtpVlanEntry.vtpVlanState.1.1 :
INTEGER: operational
cisco.ciscoMgmt.ciscoVtpMIB.vtpMIBObjects.vlanInfo.vtpVlanTable.vtpVlanEntry.vtpVlanState.1.6 :
INTEGER: operational
cisco.ciscoMgmt.ciscoVtpMIB.vtpMIBObjects.vlanInfo.vtpVlanTable.vtpVlanEntry.vtpVlanState.1.11 :
INTEGER: operational
```

注意：某些SNMP版本要求您在SNMP SET命令中的OID之前使用(.)。

使用SNMP從Cisco Catalyst交換器刪除VLAN

逐步說明

在此範例中，VLAN 48會從交換器中刪除。如需詳細資訊，請參閱使用SNMP將VLAN新增到Cisco Catalyst。刪除VLAN的本節與新增VLAN的本節的區別在於，您對vtpVlanEditRowStatus使用destroy而不是CreateAndGo命令：

1. 發出命令刪除VLAN 48:
   ```
   snmpset -c private crumpy vtpVlanEditOperation.1 integer 2
   cisco.ciscoMgmt.ciscoVtpMIB.vtpMIBObjects.vlanEdit.vtpEditControlTable.vtpEditControlEntry.
   vtpVlanEditOperation.1 : INTEGER: copy
   snmpset -c private crumpy vtpVlanEditRowStatus.1.48 integer 6
   cisco.ciscoMgmt.ciscoVtpMIB.vtpMIBObjects.vlanEdit.vtpVlanEditTable.vtpVlanEditEntry.vtpVla
   nEditRowStatus.1.48 : INTEGER: destroy
   ```

2. 要檢驗VLAN 48是否已刪除，請在CLI上使用vtpVlanState或show vlan:
   ```
   snmpwalk -c public crumpy vtpVlanState
   cisco.ciscoMgmt.ciscoVtpMIB.vtpMIBObjects.vlanInfo.vtpVlanTable.vtpVlanEntry.vtpVlanState.1
   .1 : INTEGER: operational
   cisco.ciscoMgmt.ciscoVtpMIB.vtpMIBObjects.vlanInfo.vtpVlanTable.vtpVlanEntry.vtpVlanState.1
   .1002 : INTEGER: operational
   …
   ```

使用SNMP將連線埠新增到Cisco Catalyst交換器上的VLAN

此範例顯示如何將連線埠Fast Ethernet 0/5新增到VLAN 48。

1. 要驗證IfIndex Fast Eth 0/5具有哪些，請發出snmpwalkifDescr:
   ```
   snmpwalk -c public crumpy ifDescr
   …
   interfaces.ifTable.ifEntry.ifDescr.6 : DISPLAY STRING- (ascii):  FastEthernet0/5
   …
   ```

2. 由於您知道埠Fast Eth 0/5的ifIndex為6，請將該埠新增到VLAN 48:
   ```
   snmpset -c private crumpy vmVlan.6 integer 48
   cisco.ciscoMgmt.ciscoVlanMembershipMIB.ciscoVlanMembershipMIBObjects.vmMembership.vmMembers
   hipTable.vmMembershipEntry.vmVlan.6 : INTEGER: 48
   ```

3. 通過再次查詢同一個OID驗證埠是否正確新增。
   ```
   snmpget -c public crumpy vmVlan.6
   cisco.ciscoMgmt.ciscoVlanMembershipMIB.ciscoVlanMembershipMIBObjects.vmMembership.vmMembers
   hipTable.vmMembershipEntry.vmVlan.6 : INTEGER: 48
   ```
   您也可以在交換器：上驗證這點
   ```
   crumpy#sh vlan
   VLAN Name                             Status    Ports
   ---- -------------------------------- --------- -------------------------------
   1    default                          active    Fa0/1, Fa0/2, Fa0/3, Fa0/4,
                                                   Fa0/6, Fa0/7, Fa0/8, Fa0/9,
                                                   Fa0/10, Fa0/11, Fa0/12, Fa0/13,
                                                   Fa0/14, Fa0/15, Fa0/16, Fa0/17,
                                                   Fa0/18, Fa0/19, Fa0/20, Fa0/21,
                                                   Fa0/22, Fa0/23, Fa0/24, Gi0/1,
   ```

```
                                              Gi0/2
48    VLAN0048                        active  Fa0/5
```

如何將埠從一個VLAN更改為另一個VLAN

此範例示範連線埠Fast Eth 0/3如何屬於VLAN 48，以及如何將其移動到VLAN 1（預設VLAN）：

1. 要驗證IfIndex Fast Eth 0/3具有哪些，請發出snmpwalkifDescr:

   snmpwalk -c public crumpy ifDescr

   …
   ```
   interfaces.ifTable.ifEntry.ifDescr.4 : DISPLAY STRING- (ascii):  FastEthernet0/3
   ```
   …

2. 由於您知道連線埠Fast Eth 0/3的ifIndex為4，因此您可以驗證連線埠目前屬於哪個VLAN:

   snmpget -c public crumpy vmVlan.4
   ```
   cisco.ciscoMgmt.ciscoVlanMembershipMIB.ciscoVlanMembershipMIBObjects.vmMembership.vmMembers
   hipTable.vmMembershipEntry.vmVlan.4 : INTEGER: 48
   ```

3. 此連線埠屬於VLAN 48。

   snmpset -c private crumpy vmVlan.4 integer 1
   ```
   cisco.ciscoMgmt.ciscoVlanMembershipMIB.ciscoVlanMembershipMIBObjects.vmMembership.vmMembers
   hipTable.vmMembershipEntry.vmVlan.4 : INTEGER: 1
   ```

4. 若要將連線埠從VLAN 48移動到VLAN 1，請發出snmpset vmVlan。
5. 要驗證埠是否已更改為另一個VLAN，請再次查詢vmVlan:

   snmpget -c public crumpy vmVlan.4
   ```
   cisco.ciscoMgmt.ciscoVlanMembershipMIB.ciscoVlanMembershipMIBObjects.vmMembership.vmMembers
   hipTable.vmMembershipEntry.vmVlan.4 : INTEGER: 1
   ```

   您也可以在交換器上驗證這點：更改之前：
   ```
   crumpy#sh vlan
   VLAN Name                             Status    Ports
   ---- -------------------------------- --------- -------------------------------
   1    default                          active    Fa0/1, Fa0/2, Fa0/4, Fa0/5,
                                                   Fa0/6, Fa0/7, Fa0/8, Fa0/9,
                                                   Fa0/10, Fa0/11, Fa0/12, Fa0/13,
                                                   Fa0/14, Fa0/15, Fa0/16, Fa0/17,
                                                   Fa0/18, Fa0/19, Fa0/20, Fa0/21,
                                                   Fa0/22, Fa0/23, Fa0/24, Gi0/1,
                                                   Gi0/2
   48   VLAN0048                         active    Fa0/3
   ```
   變更後：
   ```
   crumpy#sh vlan
   VLAN Name                             Status    Ports
   ---- -------------------------------- --------- -------------------------------
   1    default                          active    Fa0/1, Fa0/2, Fa0/3, Fa0/4,
                                                   Fa0/5, Fa0/6, Fa0/7, Fa0/8,
                                                   Fa0/9, Fa0/10, Fa0/11, Fa0/12,
                                                   Fa0/13, Fa0/14, Fa0/15, Fa0/16,
                                                   Fa0/17, Fa0/18, Fa0/19, Fa0/20,
                                                   Fa0/21, Fa0/22, Fa0/23, Fa0/24,
                                                   Gi0/1, Gi0/2
   48   VLAN0048                         active
   ```
   注意：您可以進行其他變更，例如VLAN名稱、所有者等。有關OID的詳細資訊，請參閱整個MIB。

相關資訊

- 技術支援 - Cisco Systems