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## The Virtual Fabrics MIB

### Status of This Memo

This document specifies an Internet standards track protocol for the Internet community, and requests discussion and suggestions for improvements. Please refer to the current edition of the "Internet Official Protocol Standards" (STD 1) for the standardization state and status of this protocol. Distribution of this memo is unlimited.

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### 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 for information related to the Fibre Channel network's Virtual Fabrics function.

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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 describes managed objects for information related to the Fibre Channel network's Virtual Fabric function.

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in RFC 2119 [RFC2119].

## 2. 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 a MIB module that is compliant to the SMIV2, which is described in STD 58, RFC 2578 [RFC2578], STD 58, RFC 2579 [RFC2579] and STD 58, RFC 2580 [RFC2580].

## 3. Short Overview of Fibre Channel

The Fibre Channel (FC) is logically a bidirectional point-to-point serial data channel, structured for high performance. Fibre Channel provides a general transport vehicle for higher-level protocols such as Small Computer System Interface (SCSI) command sets, the High-Performance Parallel Interface (HIPPI) data framing, IP (Internet Protocol), IEEE 802.2, and others.

Physically, Fibre Channel is an interconnection of multiple communication points, called N\_Ports, interconnected either by a switching network, called a Fabric, or by a point-to-point link. A Fibre Channel "node" consists of one or more N\_Ports. A Fabric may consist of multiple Interconnect Elements, some of which are switches. An N\_Port connects to the Fabric via a port on a switch called an F\_Port. When multiple FC nodes are connected to a single port on a switch via an "Arbitrated Loop" topology, the switch port is called an FL\_Port, and the nodes' ports are called NL\_Ports. The term Nx\_Port is used to refer to either an N\_Port or an NL\_Port. The term Fx\_Port is used to refer to either an F\_Port or an FL\_Port. A switch port, which is interconnected to another switch port via an

Inter-Switch Link (ISL), is called an E\_Port. A B\_Port connects a bridge device with an E\_Port on a switch; a B\_Port provides a subset of E\_Port functionality.

Many Fibre Channel components (including the Fabric, each node, and most ports) have globally-unique names. These globally-unique names are typically formatted as World Wide Names (WWNs). More information on WWNs can be found in [FC-FS]. WWNs are expected to be persistent across agent and unit resets.

Fibre Channel frames contain 24-bit address identifiers that identify the frame's source and destination ports. Each FC port has both an address identifier and a WWN. When a Fabric is in use, the FC address identifiers are dynamic and are assigned by a switch. Each octet of a 24-bit address represents a level in an address hierarchy, with a Domain\_ID being the highest level of the hierarchy.

Virtual Fabrics allow a single physical Fabric to be divided into multiple logical Fabrics. Each Virtual Fabric may be managed independently like traditional Fabrics. Virtual Fabrics are designed to achieve a better utilization of a physical infrastructure and to isolate events in one Virtual Fabric from affecting other Fabrics. When one Core Switch provides switching functions for multiple Virtual Fabrics, that Core Switch is modeled as containing multiple Virtual Switches, one for each Virtual Fabric.

Each Virtual Fabric is identified by a 12-bit Virtual Fabric ID (VF\_ID). When frames from multiple Virtual Fabrics are transmitted over a physical link, the VF\_ID carried in a frame's Virtual Fabric Tagging Header (VFT\_Header) identifies which Virtual Fabric the frame belongs to. The use of VFT\_Headers is enabled through an initial negotiation exchange between the two connected ports.

#### 4. Relationship to Other MIBs

This MIB extends beyond [RFC4044] to cover the functionality, in Fibre Channel switches, of providing Fibre Channel's Virtual Fabrics function.

#### 5. MIB Overview

This MIB module provides the means for monitoring the operation of, and configuring some parameters of, one or more instances of Fibre Channel Virtual Fabric functionality. (Note that there are no definitions in this MIB module of "managed actions" which can be invoked via a remote network management protocol such as SNMP.)

The following MIB module has IMPORTS from [RFC2578], [RFC2579], [RFC2580], [RFC2863], [RFC4044], and [RFC4439]. In REFERENCE clauses, it refers to [FC-SW-4].

### 5.1. Fibre Channel Management Instance

A Fibre Channel management instance is defined in [RFC4044] as a separable managed instance of Fibre Channel functionality. Fibre Channel functionality may be grouped into Fibre Channel management instances in whatever way is most convenient for the implementation(s). For example, one such grouping accommodates a single SNMP agent having multiple AgentX [RFC2741] sub-agents, with each sub-agent implementing a different Fibre Channel management instance.

The object, `fcmInstanceIndex`, is IMPORTed from the FC-MGMT-MIB [RFC4044] as the index value to uniquely identify each Fibre Channel management instance, for example within the same SNMP context ([RFC3411] section 3.3.1). The `t11vfVirtualSwitchTable` augments the `fcmSwitchTable`, and the primary index variable of the `fcmSwitchTable` is `fcmInstanceIndex`.

### 5.2. Representing Core and Virtual Switches

In the presence of Virtual Switches, `fcmSwitchTable` in RFC4044 contains a row for each Virtual Switch. `fcmSwitchTable`, `t11vfCoreSwitchTable`, and `t11vfVirtualSwitchTable` are complementary. The `t11vfCoreSwitchTable` and `t11vfVirtualSwitchTable` contain information that helps the management client determine which Switches are Virtual Switches and how each relates to a Core Switch. A Virtual Switch must reside in a single Core Switch, and a Core Switch is defined as a set of entities with the same `Core Switch_Name`.

RFC 4044 was defined before Virtual Switches were standard and represented only physical Switches, so the RFC 4044 tables were not defined as read-create. With the advent of Virtual Switches, Virtual Switches can now be created by administrators, and read-create tables are required. The `StorageType` of RFC 4044 tables were not defined, and `StorageTypes` used in this MIB should also apply to the RFC 4044 tables that this MIB augments.

## 6. The T11-FC-VIRTUAL-FABRIC-MIB Module

```
T11-FC-VIRTUAL-FABRIC-MIB DEFINITIONS ::= BEGIN
```

```
IMPORTS
```

```
    MODULE-IDENTITY, OBJECT-TYPE,
    Unsigned32, mib-2
                                FROM SNMPv2-SMI          -- [RFC2578]
    MODULE-COMPLIANCE, OBJECT-GROUP
                                FROM SNMPv2-CONF         -- [RFC2580]
    RowStatus, StorageType FROM SNMPv2-TC              -- [RFC2579]
    InterfaceIndex          FROM IF-MIB                -- [RFC2863]
    fcmInstanceIndex, FcNameIdOrZero,
    fcmPortEntry, fcmSwitchEntry
                                FROM FC-MGMT-MIB         -- [RFC4044]
    T11FabricIndex          FROM T11-TC-MIB;            -- [RFC4439]
```

```
t11FcVirtualFabricMIB MODULE-IDENTITY
```

```
    LAST-UPDATED      "200611100000Z"
    ORGANIZATION      "IETF IMSS (Internet and Management Support
    for Storage) Working Group"
```

```
    CONTACT-INFO
```

```
    "
```

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        Postal: 170 West Tasman Drive
        San Jose, CA USA 95134
```

```
    "
```

```
DESCRIPTION
```

```
    "This module defines management information specific to
    Fibre Channel Virtual Fabrics. A Virtual Fabric is a
```

Fabric composed of partitions of switches, links and N\_Ports with a single Fabric management domain, Fabric Services and independence from other Virtual Fabrics.

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REVISION "200611100000Z"

DESCRIPTION

"Initial version of this MIB module, published as RFC 4747."

::= { mib-2 147 }

t1lvfObjects OBJECT IDENTIFIER ::= { t1lFcVirtualFabricMIB 1 }  
t1lvfConformance OBJECT IDENTIFIER ::= { t1lFcVirtualFabricMIB 2 }

--\*\*\*\*\*

-- MIB object definitions

--

t1lvfCoreSwitchTable OBJECT-TYPE

SYNTAX SEQUENCE OF T1lvfCoreSwitchEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"A table of core switches supported by the current management entity."

::= { t1lvfObjects 1 }

t1lvfCoreSwitchEntry OBJECT-TYPE

SYNTAX T1lvfCoreSwitchEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"Each entry represents one core switch."

INDEX { fcmInstanceIndex, t1lvfCoreSwitchSwitchName }

::= { t1lvfCoreSwitchTable 1 }

T1lvfCoreSwitchEntry ::=

SEQUENCE {

t1lvfCoreSwitchSwitchName FcNameIdOrZero,

t1lvfCoreSwitchMaxSupported Unsigned32,

t1lvfCoreSwitchStorageType StorageType

}

t1lvfCoreSwitchSwitchName OBJECT-TYPE

SYNTAX FcNameIdOrZero (SIZE(8 | 16))

MAX-ACCESS not-accessible

STATUS current

## DESCRIPTION

"The Core Switch\_Name (WWN) of this Core Switch."

::= { t1lvfCoreSwitchEntry 1 }

## t1lvfCoreSwitchMaxSupported OBJECT-TYPE

SYNTAX Unsigned32 (1..4095)

MAX-ACCESS read-write

STATUS current

## DESCRIPTION

"In switches that do not support Virtual Fabrics, this object has the value of 1. If Virtual Fabrics are supported, this object is the maximum number of Virtual Fabrics supported by the Core Switch. For the purpose of this count, the Control VF\_ID is ignored."

::= { t1lvfCoreSwitchEntry 2 }

## t1lvfCoreSwitchStorageType OBJECT-TYPE

SYNTAX StorageType

MAX-ACCESS read-write

STATUS current

## DESCRIPTION

"The storage type for this conceptual row. Conceptual rows having the value 'permanent' need not allow write-access to any columnar objects in the row."

DEFVAL { nonVolatile }

::= { t1lvfCoreSwitchEntry 3 }

## -- Virtual Switch table

## t1lvfVirtualSwitchTable OBJECT-TYPE

SYNTAX SEQUENCE OF T1lvfVirtualSwitchEntry

MAX-ACCESS not-accessible

STATUS current

## DESCRIPTION

"A table of Virtual Switches. When one Core Switch provides switching functions for multiple Virtual Fabrics, that Core Switch is modeled as containing multiple Virtual Switches, one for each Virtual Fabric. This table contains one row for every Virtual Switch on every Core Switch. This table augments the basic switch information in the fcmSwitchTable Table in the FC-MGMT-MIB."

## REFERENCE

"fcmSwitchTable is defined in the FC-MGMT-MIB [RFC4044]."

::= { t1lvfObjects 2 }

## t1lvfVirtualSwitchEntry OBJECT-TYPE

SYNTAX T1lvfVirtualSwitchEntry

MAX-ACCESS not-accessible  
 STATUS current  
 DESCRIPTION

"An entry of the Virtual Switch table. Each row is for a Virtual Switch.

This table augments the fcmSwitchTable, i.e., every entry in this table has a one-to-one correspondence with an entry in the fcmSwitchTable. At the time when the fcmSwitchTable was defined, it applied to physical switches. With the definition and usage of virtual switches, fcmSwitchTable now applies to virtual switches as well as physical switches, and (in contrast to physical switches) it is appropriate to provide the capability for virtual switches to be created via remote management applications, e.g., via SNMP.

So, this entry contains a RowStatus object (to allow the creation of a virtual switch), as well as a StorageType object. Obviously, if a row is created/deleted in this table, the corresponding row in the fcmSwitchTable will be created/deleted."

#### REFERENCE

"fcmSwitchEntry is defined in the FC-MGMT-MIB module [RFC4044]."

AUGMENTS { fcmSwitchEntry }  
 ::= { t1lvfVirtualSwitchTable 1 }

T1lvfVirtualSwitchEntry ::=

```
SEQUENCE {
    t1lvfVirtualSwitchVfId          T1lFabricIndex,
    t1lvfVirtualSwitchCoreSwitchName FcNameIdOrZero,
    t1lvfVirtualSwitchRowStatus     RowStatus,
    t1lvfVirtualSwitchStorageType    StorageType
}
```

t1lvfVirtualSwitchVfId OBJECT-TYPE

SYNTAX T1lFabricIndex  
 MAX-ACCESS read-create  
 STATUS current  
 DESCRIPTION

"The VF\_ID of the Virtual Fabric for which this virtual switch performs its switching function. The Control VF\_ID is implicitly enabled and is not set. Communication with the Control VF\_ID is required."

#### REFERENCE

"FC-SW-4, REV 7.5, section 12.2"

::= { t1lvfVirtualSwitchEntry 1 }



```
t1lvfVirtualSwitchCoreSwitchName OBJECT-TYPE
    SYNTAX      FcNameIdOrZero (SIZE(8 | 16))
    MAX-ACCESS   read-only
    STATUS       current
    DESCRIPTION
        "The Core Switch_Name (WWN) of the Core Switch that
         contains this Virtual Switch."
    REFERENCE
        "FC-SW-4, REV 7.5, section 12.2."
    ::= { t1lvfVirtualSwitchEntry 2 }

t1lvfVirtualSwitchRowStatus OBJECT-TYPE
    SYNTAX      RowStatus
    MAX-ACCESS   read-create
    STATUS       current
    DESCRIPTION
        "The status of this row."
    ::= { t1lvfVirtualSwitchEntry 3 }

t1lvfVirtualSwitchStorageType OBJECT-TYPE
    SYNTAX      StorageType
    MAX-ACCESS   read-create
    STATUS       current
    DESCRIPTION
        "The storage type for this conceptual row.
         Conceptual rows having the value 'permanent' need not
         allow write-access to any columnar objects in the row."
    DEFVAL { nonVolatile }
    ::= { t1lvfVirtualSwitchEntry 4 }

-- Port table

t1lvfPortTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF T1lvfPortEntry
    MAX-ACCESS   not-accessible
    STATUS       current
    DESCRIPTION
        "A table of Port attributes related to Virtual Fabrics."
    ::= { t1lvfObjects 3 }

t1lvfPortEntry OBJECT-TYPE
    SYNTAX      T1lvfPortEntry
    MAX-ACCESS   not-accessible
    STATUS       current
    DESCRIPTION
        "Each entry represents a physical Port on a switch.
         Switches that support Virtual Fabrics would add
```

```

        these four additional columns to the fcmPortEntry
        row."
REFERENCE
    "fcmPortEntry is defined in the FC-MGMT-MIB module."
AUGMENTS    { fcmPortEntry }
::= { t11vfPortTable 1}

T11vfPortEntry ::=
    SEQUENCE {
        t11vfPortVfId                T11FabricIndex,
        t11vfPortTaggingAdminStatus  INTEGER,
        t11vfPortTaggingOperStatus   INTEGER,
        t11vfPortStorageType          StorageType
    }

t11vfPortVfId OBJECT-TYPE
    SYNTAX      T11FabricIndex
    MAX-ACCESS  read-write
    STATUS      current
    DESCRIPTION
        "The Port VF_ID assigned to this Port.  The Port VF_ID is the
        default Virtual Fabric that is assigned to untagged frames
        arriving at this Port.  The Control VF_ID is implicitly
        enabled and is not set.  Communication with the Control
        VF_ID is required."
    REFERENCE
        "FC-SW-4, REV 7.5, section 12.1"
    DEFVAL      {1}
    ::= { t11vfPortEntry 1 }

t11vfPortTaggingAdminStatus OBJECT-TYPE
    SYNTAX INTEGER {
        off(1),
        on(2),
        auto(3)
    }
    MAX-ACCESS  read-write
    STATUS      current
    DESCRIPTION
        "This object is used to configure the administrative status
        of Virtual Fabric tagging on this Port.

        SET operation      Description
        -----
        off(1)             To disable Virtual Fabric tagging on this
                           Port.

        on(2)              To enable Virtual Fabric tagging on this

```

Port if the attached Port doesn't prohibit it.

auto(3) To enable Virtual Fabric tagging if the peer requests it."

## REFERENCE

"FC-SW-4, REV 7.5, section 12.4"  
::= { t1lvfPortEntry 2 }

## t1lvfPortTaggingOperStatus OBJECT-TYPE

SYNTAX INTEGER {  
off(1),  
on(2)  
}

MAX-ACCESS read-only

STATUS current

## DESCRIPTION

"This object is used to report the operational status of Virtual Fabric tagging on this Port.

SET operation	Description
off(1)	Virtual Fabric tagging is disabled on this Port.
on(2)	Virtual Fabric tagging is enabled on this Port."

## REFERENCE

"FC-SW-4, REV 7.5, section 12.4"  
::= { t1lvfPortEntry 3 }

## t1lvfPortStorageType OBJECT-TYPE

SYNTAX StorageType

MAX-ACCESS read-write

STATUS current

## DESCRIPTION

"The storage type for this conceptual row, and for the corresponding row in the augmented fcmPortTable.

Conceptual rows having the value 'permanent' need not allow write-access to any columnar objects in the row."

DEFVAL { nonVolatile }

::= { t1lvfPortEntry 4 }

## -- Locally Enabled Table

## t1lvfLocallyEnabledTable OBJECT-TYPE

SYNTAX SEQUENCE OF T11vfLocallyEnabledEntry  
 MAX-ACCESS not-accessible  
 STATUS current  
 DESCRIPTION

"A table for assigning and reporting operational status of locally-enabled Virtual Fabric IDs to Ports. The set of Virtual Fabrics operational on the Port is the bit-wise 'AND' of the set of locally-enabled VF\_IDS of this Port and the locally-enabled VF\_IDS of the attached Port."

::= { t11vfObjects 4 }

t11vfLocallyEnabledEntry OBJECT-TYPE

SYNTAX T11vfLocallyEnabledEntry  
 MAX-ACCESS not-accessible  
 STATUS current  
 DESCRIPTION

"An entry for each locally-enabled VF\_ID on each Port."

REFERENCE

"FC-SW-4, REV 7.5, section 12.4"

INDEX { t11vfLocallyEnabledPortIfIndex, t11vfLocallyEnabledVfId }

::= { t11vfLocallyEnabledTable 1 }

T11vfLocallyEnabledEntry ::=

SEQUENCE {  
     t11vfLocallyEnabledPortIfIndex InterfaceIndex,  
     t11vfLocallyEnabledVfId T11FabricIndex,  
     t11vfLocallyEnabledOperStatus INTEGER,  
     t11vfLocallyEnabledRowStatus RowStatus,  
     t11vfLocallyEnabledStorageType StorageType  
 }

t11vfLocallyEnabledPortIfIndex OBJECT-TYPE

SYNTAX InterfaceIndex  
 MAX-ACCESS not-accessible  
 STATUS current  
 DESCRIPTION

"The value of the ifIndex that identifies the Port."

::= { t11vfLocallyEnabledEntry 1 }

t11vfLocallyEnabledVfId OBJECT-TYPE

SYNTAX T11FabricIndex  
 MAX-ACCESS not-accessible  
 STATUS current  
 DESCRIPTION

"A locally-enabled VF\_ID on this Port."

::= { t11vfLocallyEnabledEntry 2 }

## t11vfLocallyEnabledOperStatus OBJECT-TYPE

```
SYNTAX INTEGER {
    off(1),
    on(2)
}
```

```
MAX-ACCESS read-only
```

```
STATUS current
```

## DESCRIPTION

"This object is used to report the operational status of Virtual Fabric tagging on this Port.

SET operation	Description
off(1)	Virtual Fabric tagging is disabled on this Port.
on(2)	Virtual Fabric tagging is enabled on this Port."

## REFERENCE

"FC-SW-4, REV 7.3, section 12.4"

```
::= { t11vfLocallyEnabledEntry 3 }
```

## t11vfLocallyEnabledRowStatus OBJECT-TYPE

```
SYNTAX RowStatus
```

```
MAX-ACCESS read-create
```

```
STATUS current
```

## DESCRIPTION

"The status of this conceptual row.

When a row in this table is in 'active(1)' state, no object in that row can be modified except t11vfLocallyEnabledRowStatus and t11vfLocallyEnabledStorageType."

```
::= { t11vfLocallyEnabledEntry 4 }
```

## t11vfLocallyEnabledStorageType OBJECT-TYPE

```
SYNTAX StorageType
```

```
MAX-ACCESS read-create
```

```
STATUS current
```

## DESCRIPTION

"The storage type for this conceptual row.

Conceptual rows having the value 'permanent' need not allow write-access to any columnar objects in the row."

```
DEFVAL { nonVolatile }
```

```
::= { t11vfLocallyEnabledEntry 5 }
```

--\*\*\*\*\*

```
-- Conformance Section
--
```

```
t11vfMIBCompliances OBJECT IDENTIFIER ::= { t11vfConformance 1 }
t11vfMIBGroups       OBJECT IDENTIFIER ::= { t11vfConformance 2 }
```

```
t11vfMIBCompliance MODULE-COMPLIANCE
```

```
    STATUS current
```

```
    DESCRIPTION
```

```
        "Describes the requirements for compliance to the
         Fibre Channel Virtual Fabric MIB."
```

```
    MODULE -- this module
```

```
        MANDATORY-GROUPS { t11vfGeneralGroup }
```

```
        OBJECT t11vfCoreSwitchMaxSupported
```

```
        MIN-ACCESS read-only
```

```
        DESCRIPTION
```

```
            "Write access is not required."
```

```
        OBJECT t11vfCoreSwitchStorageType
```

```
        MIN-ACCESS read-only
```

```
        DESCRIPTION
```

```
            "Write access is not required."
```

```
        OBJECT t11vfVirtualSwitchVfId
```

```
        MIN-ACCESS read-only
```

```
        DESCRIPTION
```

```
            "Write access is not required."
```

```
        OBJECT t11vfVirtualSwitchRowStatus
```

```
        SYNTAX RowStatus { active(1) }
```

```
        MIN-ACCESS read-only
```

```
        DESCRIPTION
```

```
            "Write access is not required."
```

```
        OBJECT t11vfVirtualSwitchStorageType
```

```
        MIN-ACCESS read-only
```

```
        DESCRIPTION
```

```
            "Write access is not required."
```

```
        OBJECT t11vfPortVfId
```

```
        MIN-ACCESS read-only
```

```
        DESCRIPTION
```

```
            "Write access is not required."
```

```
        OBJECT t11vfPortTaggingAdminStatus
```

```
        MIN-ACCESS read-only
```

```
        DESCRIPTION
```

```
        "Write access is not required."

OBJECT t1lvfPortStorageType
MIN-ACCESS read-only
DESCRIPTION
    "Write access is not required."

OBJECT t1lvfLocallyEnabledRowStatus
SYNTAX      RowStatus { active(1) }
MIN-ACCESS read-only
DESCRIPTION
    "Write access is not required."

OBJECT t1lvfLocallyEnabledStorageType
MIN-ACCESS read-only
DESCRIPTION
    "Write access is not required."

::= { t1lvfMIBCompliances 1 }

-- Units of conformance

t1lvfGeneralGroup OBJECT-GROUP
    OBJECTS { t1lvfCoreSwitchMaxSupported,
               t1lvfVirtualSwitchVfId,
               t1lvfVirtualSwitchCoreSwitchName,
               t1lvfVirtualSwitchRowStatus,
               t1lvfPortVfId,
               t1lvfPortTaggingAdminStatus,
               t1lvfLocallyEnabledOperStatus,
               t1lvfPortTaggingOperStatus,
               t1lvfLocallyEnabledRowStatus,
               t1lvfCoreSwitchStorageType,
               t1lvfVirtualSwitchStorageType,
               t1lvfPortStorageType,
               t1lvfLocallyEnabledStorageType
    }
    STATUS current
    DESCRIPTION
        "A collection of objects for monitoring and
        configuring Virtual Fabrics in a Fibre Channel switch."
    ::= { t1lvfMIBGroups 1 }
```

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 objects and their sensitivity/vulnerability:

t1lvfCoreSwitchMaxSupported, t1lvfVirtualSwitchVfId,  
t1lvfCoreSwitchStorageType, t1lvfVirtualSwitchStorageType and  
t1lvfVirtualSwitchRowStatus

- the ability to change the configuration of Virtual Fabrics on a particular switch.

t1lvfPortTaggingAdminStatus, t1lvfLocallyEnabledRowStatus,  
t1lvfPortVfId, t1lvfPortStorageType and  
t1lvfLocallyEnabledStorageType

- the ability to change the configuration of Virtual Fabrics on a port of a particular switch.

Some 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 are the tables and objects and their sensitivity/vulnerability:

t1lvfVirtualSwitchCoreSwitchName, t1lvfPortTaggingOperStatus,  
t1lvfLocallyEnabledOperStatus,

- the ability to discover configuration of Virtual Fabrics on a virtual switch or a port.

SNMP versions prior to SNMPv3 did not include adequate security. Even if the network itself is secure (for example by using IPSec), even then, there is no control as to who on the secure network is allowed to access and GET/SET (read/change/create/delete) the objects in this MIB module.

It is RECOMMENDED that implementers consider the security features as provided by the SNMPv3 framework (see [RFC3410], section 8), including full support for the SNMPv3 cryptographic mechanisms (for authentication and privacy).



Further, deployment of SNMP versions prior to SNMPv3 is NOT RECOMMENDED. Instead, it is RECOMMENDED to deploy SNMPv3 and to enable cryptographic security. It is then a customer/operator responsibility to ensure that the SNMP entity giving access to an instance of this MIB module is properly configured to give access to the objects only to those principals (users) that have legitimate rights to indeed GET or SET (change/create/delete) them.

## 8. IANA Considerations

IANA has assigned 147 for the MIB module under the appropriate subtree.

## 9. Acknowledgements

This document was developed by the INCITS Task Group T11.5. We wish to acknowledge the contributions and comments from the INCITS Technical Committee T11 and the IMSS WG, including the following:

T11 Chair: Robert Snively, Brocade  
T11 Vice Chair: Claudio Desanti, Cisco Systems  
T11.5 Chair: Roger Cummings, Symantec  
IMSS WG Chair: David Black, EMC Corporation  
Bert Wijnen, Lucent

## 10. Normative References

- [RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", BCP 14, RFC 2119, March 1997.
- [RFC2578] McCloghrie, K., Perkins, D., Schoenwaelder, J., Case, J., Rose, M., and S. Waldbusser, "Structure of Management Information Version 2 (SMIv2)", RFC 2578, April 1999.
- [RFC2579] McCloghrie, K., Perkins, D., Schoenwaelder, J., Case, J., Rose, M., and S. Waldbusser, "Textual Conventions for SMIv2", STD 58, RFC 2579, April 1999.
- [RFC2580] McCloghrie, K., Perkins, D., Schoenwaelder, J., Case, J., Rose, M., and S. Waldbusser, "Conformance Statements for SMIv2", RFC 2580, April 1999.
- [RFC2863] McCloghrie, K. and F. Kastenholz, "The Interfaces Group MIB", RFC 2863, June 2000.
- [RFC4044] McCloghrie, K., "Fibre Channel Management MIB", RFC 4044, May 2005.

- [RFC4439] DeSanti, C., Gaonkar, V., McCloghrie, K., and S. Gai,  
"Fibre Channel Fabric Address Manager MIB", RFC 4439,  
March 2006.
- [FC-FS] "Fibre Channel Framing and Signaling - 2 (FC-FS-2)", ANSI  
INCITS 1619-D,  
<http://www.t11.org/t11/stat.nsf/upnum/1619-d>, 2006.
- [FC-SW-4] "Fibre Channel Switch Fabric 4 (FC-SW-4)", ANSI INCITS  
418-2006, <http://www.t11.org/t11/stat.nsf/upnum/1674-d>,  
2006.

## 11. Informative References

- [RFC3410] Case, J., Mundy, R., Partain, D., and B. Stewart,  
"Introduction and Applicability Statements for Internet-  
Standard Management Framework", RFC 3410, December 2002.
- [RFC2741] Daniele, M., Wijnen, B., Ellison, M., and D. Francisco,  
"Agent Extensibility (AgentX) Protocol Version 1", RFC  
2741, January 2000.
- [RFC3411] Harrington, D., Presuhn, R., and B. Wijnen, "An  
Architecture for Describing Simple Network Management  
Protocol (SNMP) Management Frameworks", STD 62, RFC 3411,  
December 2002.

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