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Definitions of Managed Objects for iFCP

Status of this Memo

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Abstract

The iFCP protocol [[RFC4172](#)] provides Fibre Channel fabric functionality on an IP network in which TCP/IP switching and routing elements replace Fibre Channel components. The iFCP protocol is used between iFCP Gateways. This draft provides a mechanism to monitor and control iFCP Gateway instances, and their associated sessions, using SNMP.

This memo is a product of the IP Storage (IPS) working group within the Internet Engineering Task Force. Comments are solicited and should be addressed to the working group's mailing list at

ips@ietf.org and/or the authors.

Gibbons Expires April 2006 1

Internet Draft iFCP MIB October 2005

Table of Contents

Status of this Memo.....	1
Abstract.....	1
Table of Contents.....	2
1. The Internet-Standard Management Framework.....	3
2. Introduction.....	3
3. Technical Description.....	4
4. MIB Definition.....	4
5. IANA Considerations.....	23
6. Security Considerations.....	23
7. Normative References.....	24
8. Informative References.....	25
9. Authors' Addresses.....	25
10. Intellectual Property Statement.....	26
11. Full Copyright Statement.....	26
12. Disclaimer of Validity.....	26
13. Acknowledgment.....	27

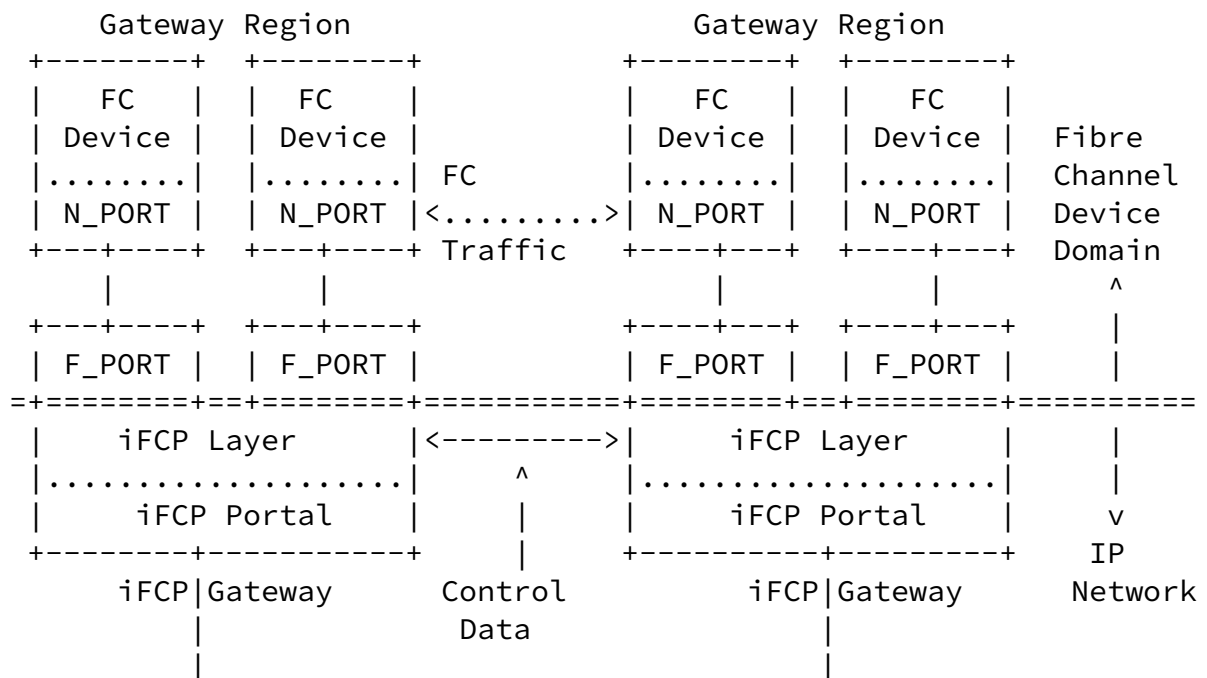
1. The Internet-Standard Management Framework

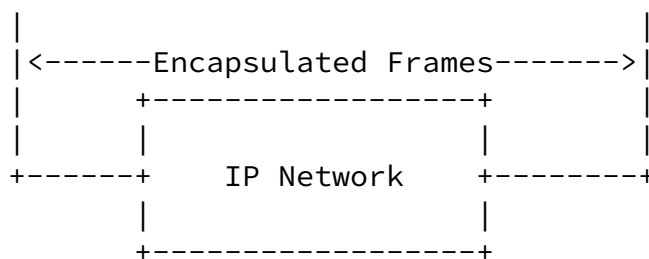
For a detailed overview of the documents that describe the current Internet-Standard Management Framework, please refer to [section 7 of RFC 3410 \[RFC3410\]](#).

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 \[RFC2580\]](#).

2. Introduction

The iFCP protocol can be used by FC to IP based storage gateways for Fibre Channel Protocol (FCP) storage interconnects. Figure 1 provides an example interconnect between iFCP gateways.





The iFCP MIB Module is designed to allow SNMP to be used to monitor and manage local iFCP gateway instances, including the configuration of iFCP sessions between gateways.

Gibbons

Expires April 2006

3

Internet Draft

iFCP MIB

October 2005

3. Technical Description

The iFCP MIB Module is divided into sections for iFCP local gateway instance management, iFCP session management, and iFCP session statistics.

The section for iFCP gateway management provides default settings and information about each local instance. A single management entity can monitor multiple local gateway instances. Each local gateway is conceptually an independent gateway that has both Fibre Channel and IP interfaces. The default IP Time Out Value (IP_TOV) is configurable for each gateway. Other standard MIBs, such as the Fibre Management MIB [[RFC4044](#)] or Interfaces Group MIB [[RFC2863](#)], can be used to manage non-iFCP specific gateway parameters. The local gateway instance section provides iFCP specific information as well as optional links to other standard management MIBs.

The iFCP session management section provides information on iFCP sessions that are using one of the local iFCP gateway instances. This section allows the management of specific iFCP parameters, including changing the IP_TOV from the default setting of the gateway.

The iFCP session statistics section provides statistical information on the iFCP sessions that are using one of the local iFCP gateways. These tables augment the session management table. Additional statistical information for an iFCP gateway or session, that is not iFCP specific, can be obtained using other standard MIBs. The iFCP statistics are provided in both standard and low-capacity (counter32) methods.

The following MIB module imports from RMON2-MIB [[RFC2021](#)], SNMPv2-SMI [[RFC2578](#)], SNMPv2-TC [[RFC2579](#)], SNMPv2-CONF [[RFC2580](#)], HCNUM-TC [[RFC2856](#)], IF-MIB [[RFC2863](#)], SNMP-FRAMEWORK-MIB [[RFC3411](#)], INET-

ADDRESS-MIB [[RFC4001](#)], FC-MGMT-MIB [[RFC4044](#)], and ENTITY-MIB (v3) [[RFC4133](#)].

4. MIB Definition

```
IFCP-MGMT-MIB DEFINITIONS ::= BEGIN
```

```
IMPORTS
```

```
    MODULE-IDENTITY,  
    OBJECT-TYPE,  
    Gauge32,  
    Integer32,  
    Unsigned32,  
    transmission  
        FROM SNMPv2-SMI
```

```
    OBJECT-GROUP,  
    MODULE-COMPLIANCE
```

```
Gibbons                               Expires April 2006                               4
```

```
Internet Draft                         iFCP MIB                                     October 2005
```

```
        FROM SNMPv2-CONF
```

```
    TEXTUAL-CONVENTION,  
    TimeStamp,  
    TruthValue,  
    StorageType  
        FROM SNMPv2-TC
```

```
-- From RFC 2021  
ZeroBasedCounter32  
    FROM RMON2-MIB
```

```
-- From RFC 2856  
ZeroBasedCounter64  
    FROM HCNM-TC
```

```
-- From RFC 2863  
InterfaceIndexOrZero  
    FROM IF-MIB
```

```
-- From RFC 3411  
SnmAdminString  
    FROM SNMP-FRAMEWORK-MIB
```

```
-- From RFC 4001  
InetAddressType,  
InetAddress,  
InetPortNumber
```

FROM INET-ADDRESS-MIB

-- From [RFC 4044](#)
FcNameIdOrZero,
FcAddressIdOrZero
FROM FC-MGMT-MIB

-- From [RFC 4133](#)
PhysicalIndexOrZero
FROM ENTITY-MIB
;

ifcpMgmtMIB MODULE-IDENTITY
LAST-UPDATED "200510040000Z"
ORGANIZATION "IETF IPS Working Group"
CONTACT-INFO "
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Gibbons Expires April 2006 5

Internet Draft iFCP MIB October 2005

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DESCRIPTION

"This module defines management information specific to internet Fibre Channel Protocol (iFCP) gateway

management.

Copyright (C) The Internet Society 2005. This version of this MIB module is part of RFC XXXX; see the RFC itself for full legal notices."

REVISION "200510040000Z"

DESCRIPTION

"Initial version of iFCP Management Module.
This MIB published as RFC XXXX."

-- RFC Ed.: replace XXXX with RFC number assigned to this document
::= { transmission YYYY }

-- RFC Ed.: enter the IANA assigned number to this MIB for YYYY

--

-- Textual Conventions

--

IfcpIpTOVorZero ::= TEXTUAL-CONVENTION

DISPLAY-HINT "d"

STATUS current

DESCRIPTION "The maximum propagation delay, in seconds, for an encapsulated FC frame to traverse the IP network. A value of 0 implies fibre channel frame lifetime limits will not be enforced."

REFERENCE "[RFC 4172](#), iFCP Protocol Specification"

SYNTAX Unsigned32 (0..3600)

Gibbons

Expires April 2006

6

Internet Draft

iFCP MIB

October 2005

IfcpLTIorZero ::= TEXTUAL-CONVENTION

DISPLAY-HINT "d"

STATUS current

DESCRIPTION "The value for the Liveness Test Interval (LTI) being used in an iFCP connection, in seconds. A value of 0 implies no Liveness Test Interval will be used."

REFERENCE "[RFC 4172](#), iFCP Protocol Specification"

SYNTAX Unsigned32 (0..65535)

IfcpSessionStates ::= TEXTUAL-CONVENTION

STATUS current

DESCRIPTION "The value for an iFCP session state."

SYNTAX INTEGER {down(1), openPending(2), open(3)}

IfcpAddressMode ::= TEXTUAL-CONVENTION

```

STATUS          current
DESCRIPTION     "The values for iFCP Address Translation
                Mode."
REFERENCE       "RFC 4172, iFCP Protocol Specification"
SYNTAX         INTEGER {addressTransparent(1),
                        addressTranslation(2)}

--
-- Internet Fibre Channel Protocol (iFCP)
--

ifcpGatewayObjects      OBJECT IDENTIFIER ::= {ifcpMgmtMIB 1}
ifcpGatewayConformance OBJECT IDENTIFIER ::= {ifcpMgmtMIB 2}

--
-- Local iFCP Gateway Instance Information =====
--

ifcpLclGatewayInfo OBJECT IDENTIFIER ::= {ifcpGatewayObjects 1}

ifcpLclGtwyInstTable OBJECT-TYPE
    SYNTAX          SEQUENCE OF IfcpLclGtwyInstEntry
    MAX-ACCESS      not-accessible
    STATUS          current
    DESCRIPTION     "Information about all local iFCP Gateway instances that can
                    be monitored and controlled. This table contains an entry
                    for each local iFCP Gateway instance that is being managed."
    ::= {ifcpLclGatewayInfo 1}

ifcpLclGtwyInstEntry OBJECT-TYPE
    SYNTAX          IfcpLclGtwyInstEntry
    MAX-ACCESS      not-accessible
    STATUS          current
    DESCRIPTION     "An entry in the local iFCP Gateway Instance table.

Gibbons          Expires April 2006          7
Internet Draft   iFCP MIB                    October 2005

Parameters and settings for the gateway are found here."
INDEX { ifcpLclGtwyInstIndex }
::= {ifcpLclGtwyInstTable 1}

IfcpLclGtwyInstEntry ::= SEQUENCE {
    ifcpLclGtwyInstIndex      Unsigned32,
    ifcpLclGtwyInstPhyIndex   PhysicalIndexOrZero,
    ifcpLclGtwyInstVersionMin Unsigned32,
    ifcpLclGtwyInstVersionMax Unsigned32,
    ifcpLclGtwyInstAddrTransMode IfcpAddressMode,

```



```

ifcpLclGtwyInstFcBrdcstSupport TruthValue,
ifcpLclGtwyInstDefaultIpTOV IfcpIpTOVorZero,
ifcpLclGtwyInstDefaultLTInterval IfcpLTIorZero,
ifcpLclGtwyInstDescr SnmpAdminString,
ifcpLclGtwyInstNumActiveSessions Gauge32,
ifcpLclGtwyInstStorageType StorageType
    }

ifcpLclGtwyInstIndex OBJECT-TYPE
    SYNTAX Unsigned32 (1..2147483647)
    MAX-ACCESS not-accessible
    STATUS current
    DESCRIPTION
    "An arbitrary integer value to uniquely identify this iFCP
    Gateway from other local Gateway instances."
    ::= {ifcpLclGtwyInstEntry 1}

ifcpLclGtwyInstPhyIndex OBJECT-TYPE
    SYNTAX PhysicalIndexOrZero
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
    "An index indicating the location of this local gateway within
    a larger entity, if one exists. If supported, this is the
    entPhysicalIndex from the Entity MIB (Version 3), for this
    iFCP Gateway. If not supported, or if not related to a
    physical entity, then the value of this object is 0."
    REFERENCE "Entity MIB (Version 3)"
    ::= {ifcpLclGtwyInstEntry 2}

ifcpLclGtwyInstVersionMin OBJECT-TYPE
    SYNTAX Unsigned32 (0..255)
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
    "The minimum iFCP protocol version supported by the local iFCP
    gateway instance."
    REFERENCE "RFC 4172, iFCP Protocol Specification"
    ::= {ifcpLclGtwyInstEntry 3}

ifcpLclGtwyInstVersionMax OBJECT-TYPE
    SYNTAX Unsigned32 (0..255)

Gibbons Expires April 2006 8

Internet Draft iFCP MIB October 2005

    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
    "The maximum iFCP protocol version supported by the local iFCP

```

```

gateway instance."
REFERENCE      "RFC 4172, iFCP Protocol Specification"
::= {ifcpLclGtwyInstEntry      4}

ifcpLclGtwyInstAddrTransMode OBJECT-TYPE
SYNTAX          IfcpAddressMode
MAX-ACCESS      read-write
STATUS          current
DESCRIPTION
"The local iFCP gateway operating mode. Changing this value
may cause existing sessions to be disrupted."
REFERENCE      "RFC 4172, iFCP Protocol Specification"
DEFVAL        { addressTranslation }
::= {ifcpLclGtwyInstEntry      5}

ifcpLclGtwyInstFcBrdcstSupport OBJECT-TYPE
SYNTAX          TruthValue
MAX-ACCESS      read-write
STATUS          current
DESCRIPTION
"Whether the local iFCP gateway supports FC Broadcast.
Changing this value may cause existing sessions to be
disrupted."
REFERENCE      "RFC 4172, iFCP Protocol Specification"
DEFVAL        { false }
::= {ifcpLclGtwyInstEntry      6}

ifcpLclGtwyInstDefaultIpTOV OBJECT-TYPE
SYNTAX          IfcpIpTOVorZero
MAX-ACCESS      read-write
STATUS          current
DESCRIPTION
"The default IP_TOV used for iFCP sessions at this gateway.
This is the default maximum propagation delay that will be
used for an iFCP session. The value can be changed on a
per-session basis. The valid range is 0 - 3600 seconds.
A value of 0 implies that fibre channel frame lifetime limits
will not be enforced."
REFERENCE      "RFC 4172, iFCP Protocol Specification"
DEFVAL        { 6 }
::= {ifcpLclGtwyInstEntry      7}

ifcpLclGtwyInstDefaultLTInterval OBJECT-TYPE
SYNTAX          IfcpLTIorZero
MAX-ACCESS      read-write
STATUS          current
DESCRIPTION
"The default Liveness Test Interval (LTI), in seconds, used

```

for iFCP sessions at this gateway. This is the default value for an iFCP session and can be changed on a per-session basis. The valid range is 0 - 65535 seconds. A value of 0 implies no Liveness Test Interval will be performed on a session."

```
REFERENCE      "RFC 4172, iFCP Protocol Specification"
DEFVAL         { 10 }
 ::= {ifcpLclGtwyInstEntry      8}
```

```
ifcpLclGtwyInstDescr OBJECT-TYPE
SYNTAX          SnmpAdminString (SIZE (0..64))
MAX-ACCESS      read-write
STATUS          current
DESCRIPTION
```

"A user entered description for this iFCP Gateway."

```
DEFVAL         { "" }
 ::= {ifcpLclGtwyInstEntry      9}
```

```
ifcpLclGtwyInstNumActiveSessions OBJECT-TYPE
SYNTAX          Gauge32 (0..4294967295)
MAX-ACCESS      read-only
STATUS          current
DESCRIPTION
```

"The current total number of iFCP sessions in the open or open-pending state."

```
 ::= {ifcpLclGtwyInstEntry      10}
```

```
ifcpLclGtwyInstStorageType OBJECT-TYPE
SYNTAX          StorageType
MAX-ACCESS      read-only
STATUS          current
DESCRIPTION
```

"The storage type for this row. Parameter values defined for a gateway are usually non-volatile, but may be volatile or permanent in some configurations. If permanent, than the following parameters must have read-write access:

ifcpLclGtwyInstAddrTransMode, ifcpLclGtwyInstDefaultIpTOV, and ifcpLclGtwyInstDefaultLTInterval."

```
DEFVAL         { nonVolatile }
 ::= {ifcpLclGtwyInstEntry      11}
```

--

-- iFCP N Port Session Information =====

--

```
ifcpNportSessionInfo
OBJECT IDENTIFIER ::= {ifcpGatewayObjects 2}
```

```
ifcpSessionAttributesTable OBJECT-TYPE
```

SYNTAX

SEQUENCE OF

MAX-ACCESS

IfcpSessionAttributesEntry
not-accessible

Gibbons

Expires April 2006

10

Internet Draft

iFCP MIB

October 2005

STATUS

current

DESCRIPTION

"An iFCP session consists of the pair of N_PORTS comprising the session endpoints joined by a single TCP/IP connection. This table provides information on each iFCP session currently using a local iFCP Gateway instance. iFCP sessions are created and removed by the iFCP Gateway instances, which are reflected in this table."

::= {ifcpNportSessionInfo 1}

ifcpSessionAttributesEntry OBJECT-TYPE

SYNTAX

IfcpSessionAttributesEntry

MAX-ACCESS

not-accessible

STATUS

current

DESCRIPTION

"An entry in the session table."

INDEX { ifcpLclGtwyInstIndex, ifcpSessionIndex }

::= {ifcpSessionAttributesTable 1}

IfcpSessionAttributesEntry ::= SEQUENCE {

ifcpSessionIndex Integer32,
ifcpSessionLclPrtlIfIndex InterfaceIndexOrZero,
ifcpSessionLclPrtlAddrType InetAddressType,
ifcpSessionLclPrtlAddr InetAddress,
ifcpSessionLclPrtlTcpPort InetPortNumber,
ifcpSessionLclNpWwun FcNameIdOrZero,
ifcpSessionLclNpFcid FcAddressIdOrZero,
ifcpSessionRmtNpWwun FcNameIdOrZero,
ifcpSessionRmtPrtlIfAddrType InetAddressType,
ifcpSessionRmtPrtlIfAddr InetAddress,
ifcpSessionRmtPrtlTcpPort InetPortNumber,
ifcpSessionRmtNpFcid FcAddressIdOrZero,
ifcpSessionRmtNpFcidAlias FcAddressIdOrZero,
ifcpSessionIpTOV IfcpIpTOVOrZero,
ifcpSessionLclLTIntvl IfcpLTIORZero,
ifcpSessionRmtLTIntvl IfcpLTIORZero,
ifcpSessionBound TruthValue,
ifcpSessionStorageType StorageType
}

ifcpSessionIndex

OBJECT-TYPE

SYNTAX

Integer32 (1..2147483647)

MAX-ACCESS

not-accessible

```

        STATUS                current
        DESCRIPTION
        "The iFCP session index is a unique value used as an index
        to the table, along with a specific local iFCP Gateway
        instance. This index is used because the local N Port and
        remote N Port information would create an complex index that
        would be difficult to implement."
        ::= {ifcpSessionAttributesEntry 1}

Gibbons                Expires April 2006                11

Internet Draft        iFCP MIB                October 2005

ifcpSessionLclPrtlIfIndex    OBJECT-TYPE
    SYNTAX                InterfaceIndexOrZero
    MAX-ACCESS            read-only
    STATUS                current
    DESCRIPTION
    "This is the interface index in the IF-MIB ifTable being used
    as the local portal in this session, as described in the
    IF-MIB. If the local portal is not associated with an entry
    in the ifTable, then the value is 0. The ifType of the
    interface will generally be a type that supports IP, but an
    implementation may support iFCP using other protocols. This
    object can be used to obtain additional information about the
    interface."
    REFERENCE            "RFC 2863, The Interfaces Group MIB (IF-MIB)"
    ::= {ifcpSessionAttributesEntry 2}

ifcpSessionLclPrtlAddrType    OBJECT-TYPE
    SYNTAX                InetAddressType
    MAX-ACCESS            read-only
    STATUS                current
    DESCRIPTION
    "The type of address in ifcpSessionLclIfAddr."
    ::= {ifcpSessionAttributesEntry 3}

ifcpSessionLclPrtlAddr        OBJECT-TYPE
    SYNTAX                InetAddress
    MAX-ACCESS            read-only
    STATUS                current
    DESCRIPTION
    "This is the external IP address of the interface being used
    for the iFCP local portal in this session. The address type
    is defined in ifcpSessionLclPrtlAddrType. If the value is a
    DNS name, then the name is resolved once, during the initial
    session instantiation."
    ::= {ifcpSessionAttributesEntry 4}

ifcpSessionLclPrtlTcpPort    OBJECT-TYPE

```

SYNTAX InetPortNumber
 MAX-ACCESS read-only
 STATUS current
 DESCRIPTION
 "This is the TCP port number that is being used for the iFCP local portal in this session. This is normally an ephemeral port number selected by the gateway. The value may be 0 during an initial setup period."
 ::= {ifcpSessionAttributesEntry 5}

ifcpSessionLclNpWwun OBJECT-TYPE
 SYNTAX FcNameIdOrZero
 MAX-ACCESS read-only
 STATUS current
 DESCRIPTION

Gibbons Expires April 2006 12

Internet Draft iFCP MIB October 2005

"World Wide Unique Name of the local N Port. For an unbound session this variable will be a zero-length string."
 REFERENCE "[RFC 4172](#), iFCP Protocol Specification"
 DEFVAL { "" }
 ::= {ifcpSessionAttributesEntry 6}

ifcpSessionLclNpFcid OBJECT-TYPE
 SYNTAX FcAddressIdOrZero
 MAX-ACCESS read-only
 STATUS current
 DESCRIPTION

"Fibre Channel Identifier of the local N Port. For an unbound session this variable will be a zero-length string."
 REFERENCE "[RFC 4172](#), iFCP Protocol Specification"
 ::= {ifcpSessionAttributesEntry 7}

ifcpSessionRmtNpWwun OBJECT-TYPE
 SYNTAX FcNameIdOrZero
 MAX-ACCESS read-only
 STATUS current
 DESCRIPTION

"World Wide Unique Name of the remote N Port. For an unbound session this variable will be a zero-length string."
 REFERENCE "[RFC 4172](#), iFCP Protocol Specification"
 DEFVAL { "" }
 ::= {ifcpSessionAttributesEntry 8}

ifcpSessionRmtPrtlIfAddrType OBJECT-TYPE
 SYNTAX InetAddressType
 MAX-ACCESS read-only
 STATUS current

REFERENCE ["RFC 4172, iFCP Protocol Specification"](#)
 ::= {ifcpSessionAttributesEntry 13}

ifcpSessionIpTOV OBJECT-TYPE
SYNTAX IfcpIpTOVorZero
MAX-ACCESS read-write
STATUS current
DESCRIPTION

"The IP_TOV being used for this iFCP session. This is the maximum propagation delay that will be used for the iFCP session. The value can be changed on a per-session basis and initially defaults to ifcpLclGtwyInstDefaultIpTOV for the local gateway instance. The valid range is 0 - 3600 seconds. A value of 0 implies fibre channel frame lifetime limits will not be enforced."

REFERENCE ["RFC 4172, iFCP Protocol Specification"](#)
 ::= {ifcpSessionAttributesEntry 14}

ifcpSessionLclLTIntvl OBJECT-TYPE
SYNTAX IfcpLTIorZero
MAX-ACCESS read-only
STATUS current
DESCRIPTION

"The Liveness Test Interval (LTI) used for this iFCP session. The value can be changed on a per-session basis and initially defaults to ifcpLclGtwyInstDefaultLTInterval for the local gateway instance. The valid range is 0 - 65535 seconds.

Gibbons Expires April 2006 14

Internet Draft iFCP MIB October 2005

A value of 0 implies that the gateway will not originate Liveness Test messages for the session."

REFERENCE ["RFC 4172, iFCP Protocol Specification"](#)
 ::= {ifcpSessionAttributesEntry 15}

ifcpSessionRmtLTIntvl OBJECT-TYPE
SYNTAX IfcpLTIorZero
MAX-ACCESS read-only
STATUS current
DESCRIPTION

"The Liveness Test Interval (LTI) as requested by the remote gateway instance to use for this iFCP session. This value may change over the life of the session. The valid range is 0 - 65535 seconds. A value of 0 implies that the remote gateway has not been requested to originate Liveness Test messages for the session."

REFERENCE ["RFC 4172, iFCP Protocol Specification"](#)
 ::= {ifcpSessionAttributesEntry 16}


```

ifcpSessionBound          OBJECT-TYPE
    SYNTAX                 TruthValue
    MAX-ACCESS             read-only
    STATUS                 current
    DESCRIPTION
    "This value indicates whether this session is bound to a
    specific local and remote N Port. Sessions by default are
    unbound and ready for future assignment to a local and remote
    N Port."
    REFERENCE              "RFC 4172, iFCP Protocol Specification"
    ::= {ifcpSessionAttributesEntry 17}

```

```

ifcpSessionStorageType   OBJECT-TYPE
    SYNTAX                 StorageType
    MAX-ACCESS             read-only
    STATUS                 current
    DESCRIPTION
    "The storage type for this row. Parameter values defined
    for a session are usually non-volatile, but may be volatile
    or permanent in some configurations. If permanent, than
    ifcpSessionIpTOV must have read-write access."
    DEFVAL                 { nonVolatile }
    ::= {ifcpSessionAttributesEntry 18}

```

```

--
-- Local iFCP Gateway Instance Session Statistics =====
--

```

```

ifcpSessionStatsTable    OBJECT-TYPE
    SYNTAX                 SEQUENCE OF
                          IfcpSessionStatsEntry
    MAX-ACCESS             not-accessible
    STATUS                 current

```

Gibbons Expires April 2006 15

Internet Draft iFCP MIB October 2005

```

    DESCRIPTION
    "This table provides statistics on an iFCP session."
    ::= {ifcpNportSessionInfo 2}

```

```

ifcpSessionStatsEntry    OBJECT-TYPE
    SYNTAX                 IfcpSessionStatsEntry
    MAX-ACCESS             not-accessible
    STATUS                 current
    DESCRIPTION
    "Provides iFCP specific statistics per session."
    AUGMENTS {ifcpSessionAttributesEntry}
    ::= {ifcpSessionStatsTable 1}

```

```

IfcpSessionStatsEntry ::= SEQUENCE {
    ifcpSessionState          IfcpSessionStates,
    ifcpSessionDuration      Unsigned32,
    ifcpSessionTxOctets      ZeroBasedCounter64,
    ifcpSessionRxOctets      ZeroBasedCounter64,
    ifcpSessionTxFrames      ZeroBasedCounter64,
    ifcpSessionRxFrames      ZeroBasedCounter64,
    ifcpSessionStaleFrames   ZeroBasedCounter64,
    ifcpSessionHeaderCRCErrors ZeroBasedCounter64,
    ifcpSessionFcPayloadCRCErrors ZeroBasedCounter64,
    ifcpSessionOtherErrors   ZeroBasedCounter64,
    ifcpSessionDiscontinuityTime TimeStamp
}

ifcpSessionState          OBJECT-TYPE
    SYNTAX                 IfcpSessionStates
    MAX-ACCESS              read-only
    STATUS                  current
    DESCRIPTION
        "The current session operating state."
        ::= {ifcpSessionStatsEntry 1}

ifcpSessionDuration      OBJECT-TYPE
    SYNTAX                 Unsigned32 (0..4294967295)
    MAX-ACCESS              read-only
    STATUS                  current
    DESCRIPTION
        "This indicates, in seconds, how long the iFCP session has
        been in an open or open-pending state.  When a session is
        down the value is reset to 0."
        ::= {ifcpSessionStatsEntry 2}

ifcpSessionTxOctets      OBJECT-TYPE
    SYNTAX                 ZeroBasedCounter64
    MAX-ACCESS              read-only
    STATUS                  current
    DESCRIPTION
        "The total number of octets transmitted by the iFCP gateway
        for this session.  Discontinuities in the value of this

```

Gibbons

Expires April 2006

16

Internet Draft

iFCP MIB

October 2005

counter can occur at reinitialization of the management system, and at other times as indicated by the value of ifcpSessionDiscontinuityTime."

```
 ::= {ifcpSessionStatsEntry 3}
```

```
ifcpSessionRxOctets
```

```
OBJECT-TYPE
```

```
SYNTAX
```

```
ZeroBasedCounter64
```

MAX-ACCESS	read-only
STATUS	current
DESCRIPTION	
"The total number of octets received by the iFCP gateway for this session. Discontinuities in the value of this counter can occur at reinitialization of the management system, and at other times as indicated by the value of ifcpSessionDiscontinuityTime."	
::= {ifcpSessionStatsEntry 4}	
ifcpSessionTxFrames	OBJECT-TYPE
SYNTAX	ZeroBasedCounter64
MAX-ACCESS	read-only
STATUS	current
DESCRIPTION	
"The total number of iFCP frames transmitted by the gateway for this session. Discontinuities in the value of this counter can occur at reinitialization of the management system, and at other times as indicated by the value of ifcpSessionDiscontinuityTime."	
::= {ifcpSessionStatsEntry 5}	
ifcpSessionRxFrames	OBJECT-TYPE
SYNTAX	ZeroBasedCounter64
MAX-ACCESS	read-only
STATUS	current
DESCRIPTION	
"The total number of iFCP frames received by the gateway for this session. Discontinuities in the value of this counter can occur at reinitialization of the management system, and at other times as indicated by the value of ifcpSessionDiscontinuityTime."	
::= {ifcpSessionStatsEntry 6}	
ifcpSessionStaleFrames	OBJECT-TYPE
SYNTAX	ZeroBasedCounter64
MAX-ACCESS	read-only
STATUS	current
DESCRIPTION	
"The total number of received iFCP frames that were stale and discarded by the gateway for this session. Discontinuities in the value of this counter can occur at reinitialization of the management system, and at other times as indicated by the value of ifcpSessionDiscontinuityTime."	
::= {ifcpSessionStatsEntry 7}	

ifcpSessionHeaderCRCErrors	OBJECT-TYPE
SYNTAX	ZeroBasedCounter64
MAX-ACCESS	read-only
STATUS	current
DESCRIPTION	
<p>"The total number of CRC errors that occurred in the frame header, detected by the gateway for this session. Usually, a single Header CRC error is sufficient to terminate an iFCP session. Discontinuities in the value of this counter can occur at reinitialization of the management system, and at other times as indicated by the value of ifcpSessionDiscontinuityTime."</p>	
<pre> ::= {ifcpSessionStatsEntry 8}</pre>	
ifcpSessionFcPayloadCRCErrors	OBJECT-TYPE
SYNTAX	ZeroBasedCounter64
MAX-ACCESS	read-only
STATUS	current
DESCRIPTION	
<p>"The total number of CRC errors that occurred in the Fibre Channel frame payload, detected by the gateway for this session. Discontinuities in the value of this counter can occur at reinitialization of the management system, and at other times as indicated by the value of ifcpSessionDiscontinuityTime."</p>	
<pre> ::= {ifcpSessionStatsEntry 9}</pre>	
ifcpSessionOtherErrors	OBJECT-TYPE
SYNTAX	ZeroBasedCounter64
MAX-ACCESS	read-only
STATUS	current
DESCRIPTION	
<p>"The total number of errors, other than errors explicitly measured, detected by the gateway for this session. Discontinuities in the value of this counter can occur at reinitialization of the management system, and at other times as indicated by the value of ifcpSessionDiscontinuityTime."</p>	
<pre> ::= {ifcpSessionStatsEntry 10}</pre>	
ifcpSessionDiscontinuityTime	OBJECT-TYPE
SYNTAX	TimeStamp
MAX-ACCESS	read-only
STATUS	current
DESCRIPTION	
<p>"The value of sysUpTime on the most recent occasion at which any one or more of the ifcpSessionStatsTable counters suffered a discontinuity. The relevant counters are the specific Counter64 based instances associated with the ifcpSessionStatsTable: ifcpSessionTxOctets, ifcpSessionRxOctets, ifcpSessionTxFrames,</p>	

Internet Draft

iFCP MIB

October 2005

ifcpSessionRxFrames, ifcpSessionStaleFrames,
 ifcpSessionHeaderCRCErrors, ifcpSessionFcPayloadCRCErrors,
 and ifcpSessionOtherErrors. If no such discontinuities have
 occurred since the last reinitialization of the local
 management subsystem, then this object contains a zero value."
 ::= {ifcpSessionStatsEntry 11}

--
 -- Low Capacity Statistics
 --

ifcpSessionLcStatsTable	OBJECT-TYPE
SYNTAX	SEQUENCE OF
	IfcpSessionLcStatsEntry
MAX-ACCESS	not-accessible
STATUS	current
DESCRIPTION	

"This table provides low capacity statistics for an iFCP session. These are provided for backward compatibility with systems that do not support Counter64 based objects. At 1Gbps rates, a Counter32 based object can wrap as often as every 34 seconds. Counter32 based objects can be sufficient for many situations. However, when possible, it is recommended to use the high capacity statistics in ifcpSessionStatsTable based on Counter64 objects."
 ::= {ifcpNportSessionInfo 3}

ifcpSessionLcStatsEntry	OBJECT-TYPE
SYNTAX	IfcpSessionLcStatsEntry
MAX-ACCESS	not-accessible
STATUS	current
DESCRIPTION	

"Provides iFCP specific statistics per session."
 AUGMENTS {ifcpSessionAttributesEntry}
 ::= {ifcpSessionLcStatsTable 1}

```
IfcpSessionLcStatsEntry ::= SEQUENCE {
    ifcpSessionLcTxOctets          ZeroBasedCounter32,
    ifcpSessionLcRxOctets         ZeroBasedCounter32,
    ifcpSessionLcTxFrames         ZeroBasedCounter32,
    ifcpSessionLcRxFrames         ZeroBasedCounter32,
    ifcpSessionLcStaleFrames      ZeroBasedCounter32,
    ifcpSessionLcHeaderCRCErrors  ZeroBasedCounter32,
    ifcpSessionLcFcPayloadCRCErrors ZeroBasedCounter32,
    ifcpSessionLcOtherErrors      ZeroBasedCounter32
}
```



```

ifcpSessionLcHeaderCRCErrors      OBJECT-TYPE
    SYNTAX                          ZeroBasedCounter32
    MAX-ACCESS                       read-only
    STATUS                            current
    DESCRIPTION

```

"The total number of CRC errors that occurred in the frame header, detected by the gateway for this session. Usually, a single Header CRC error is sufficient to terminate an iFCP session."

```
 ::= {ifcpSessionLcStatsEntry 6}
```

```

ifcpSessionLcFcPayloadCRCErrors    OBJECT-TYPE

```

Gibbons Expires April 2006 20

Internet Draft iFCP MIB October 2005

```

    SYNTAX                          ZeroBasedCounter32
    MAX-ACCESS                       read-only
    STATUS                            current
    DESCRIPTION

```

"The total number of CRC errors that occurred in the Fibre Channel frame payload, detected by the gateway for this session."

```
 ::= {ifcpSessionLcStatsEntry 7}
```

```

ifcpSessionLcOtherErrors           OBJECT-TYPE
    SYNTAX                          ZeroBasedCounter32
    MAX-ACCESS                       read-only
    STATUS                            current
    DESCRIPTION

```

"The total number of errors, other than errors explicitly measured, detected by the gateway for this session."

```
 ::= {ifcpSessionLcStatsEntry 8}
```

```

ifcpCompliances
    OBJECT IDENTIFIER ::= {ifcpGatewayConformance 1}

```

```

ifcpGatewayCompliance MODULE-COMPLIANCE
    STATUS current
    DESCRIPTION

```

"Implementation requirements for iFCP MIB compliance."

```

    MODULE          -- this module
    MANDATORY-GROUPS {
        ifcpLclGatewayGroup,
        ifcpLclGatewaySessionGroup,
        ifcpLclGatewaySessionStatsGroup,
        ifcpLclGatewaySessionLcStatsGroup
    }

```

```
::= {ifcpCompliances 1}
```

```
ifcpGroups OBJECT IDENTIFIER ::= {ifcpGatewayConformance 2}
```

```
ifcpLclGatewayGroup OBJECT-GROUP
```

```
OBJECTS {  
    ifcpLclGtwyInstPhyIndex,  
    ifcpLclGtwyInstVersionMin,  
    ifcpLclGtwyInstVersionMax,  
    ifcpLclGtwyInstAddrTransMode,  
    ifcpLclGtwyInstFcBrdcstSupport,  
    ifcpLclGtwyInstDefaultIpTOV,  
    ifcpLclGtwyInstDefaultLTInterval,  
    ifcpLclGtwyInstDescr,  
    ifcpLclGtwyInstNumActiveSessions,  
    ifcpLclGtwyInstStorageType  
}  
STATUS current
```

Gibbons

Expires April 2006

21

Internet Draft

iFCP MIB

October 2005

DESCRIPTION

"iFCP local device info group. This group provides information about each gateway."

```
::= {ifcpGroups 1}
```

```
ifcpLclGatewaySessionGroup OBJECT-GROUP
```

```
OBJECTS {  
    ifcpSessionLclPrtlIfIndex,  
    ifcpSessionLclPrtlAddrType,  
    ifcpSessionLclPrtlAddr,  
    ifcpSessionLclPrtlTcpPort,  
    ifcpSessionLclNpWwun,  
    ifcpSessionLclNpFcid,  
    ifcpSessionRmtNpWwun,  
    ifcpSessionRmtPrtlIfAddrType,  
    ifcpSessionRmtPrtlIfAddr,  
    ifcpSessionRmtPrtlTcpPort,  
    ifcpSessionRmtNpFcid,  
    ifcpSessionRmtNpFcidAlias,  
    ifcpSessionIpTOV,  
    ifcpSessionLclLTIntvl,  
    ifcpSessionRmtLTIntvl,  
    ifcpSessionBound,  
    ifcpSessionStorageType  
}  
STATUS current
```

DESCRIPTION

"iFCP Session group. This group provides information

about each iFCP session currently active between iFCP gateways."

::= {ifcpGroups 4}

ifcpLclGatewaySessionStatsGroup OBJECT-GROUP

OBJECTS {

ifcpSessionState,
ifcpSessionDuration,
ifcpSessionTxOctets,
ifcpSessionRxOctets,
ifcpSessionTxFrames,
ifcpSessionRxFrames,
ifcpSessionStaleFrames,
ifcpSessionHeaderCRCErrors,
ifcpSessionFcPayloadCRCErrors,
ifcpSessionOtherErrors,
ifcpSessionDiscontinuityTime
}

STATUS current

DESCRIPTION

"iFCP Session Statistics group. This group provides statistics with 64 bit counters for each iFCP session currently active between iFCP gateways. This group is only required for agents that can support Counter64

Gibbons

Expires April 2006

22

Internet Draft

iFCP MIB

October 2005

based data types."

::= {ifcpGroups 5}

ifcpLclGatewaySessionLcStatsGroup OBJECT-GROUP

OBJECTS {

ifcpSessionLcTxOctets,
ifcpSessionLcRxOctets,
ifcpSessionLcTxFrames,
ifcpSessionLcRxFrames,
ifcpSessionLcStaleFrames,
ifcpSessionLcHeaderCRCErrors,
ifcpSessionLcFcPayloadCRCErrors,
ifcpSessionLcOtherErrors
}

STATUS current

DESCRIPTION

"iFCP Session Low Capacity Statistics group. This group provides statistics with low capacity 32 bit counters for each iFCP session currently active between iFCP gateways. This group is only required for agents which do not support Counter64 based data types, or need to support SNMPv1 applications."

```
::= {ifcpGroups 6}
```

END

5. IANA Considerations

IANA is requested to make a unique MIB OID assignment under the transmission branch.

6. 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.

Changing the following object values, with a MAX-ACCESS of read-write, may cause disruption in storage traffic:

```
ifcpLclGtwyInstAddrTransMode
ifcpLclGtwyInstFcBrdcstSupport
ifcpLclGtwyInstDefaultIpTOV
ifcpLclGtwyInstDefaultLTInterval
ifcpSessionIpTOV
```

Changing the following object value, with a MAX-ACCESS of read-write, may cause a user to lose track of the iFCP gateway:

```
ifcpLclGtwyInstDescr
```

Gibbons

Expires April 2006

23

Internet Draft

iFCP MIB

October 2005

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.

The following object tables provide information about storage traffic sessions, and can indicate to a user who is communicating and exchanging storage data:

```
ifcpLclGtwyInstTable
ifcpSessionAttributesTable
```

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 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.

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Gibbons Expires April 2006 24

Internet Draft iFCP MIB October 2005

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Gibbons

Expires April 2006

25

Internet Draft

iFCP MIB

October 2005

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Gibbons

Expires April 2006

27