

Internet Draft
<[draft-ietf-ips-ifcp-mib-03.txt](#)>
Expires: April 2003

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October 2002

Definitions of Managed Objects For iFCP

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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 defines a basic set of managed objects for SNMP-based monitoring and management of the Internet Fibre Channel Protocol (iFCP).

This memo specifies a MIB module in a manner that is compliant to the SMIV2. The set of objects is consistent with the SNMP framework and existing SNMP standards.

This memo is a product of the IP Storage (IPS) working group

Gibbons

Expires April 2003

1

Internet Draft

iFCP MIB

October 2002

within the Internet Engineering Task Force. Comments are solicited and should be addressed to the working group's mailing list at ips@ece.cmu.edu and/or the authors.

Table of Contents

Status of this Memo.....	1
Copyright Notice.....	1
Abstract.....	1
Table of Contents.....	2
1. Introduction.....	3
2. The SNMP Management Framework.....	3
3. Overview.....	4
4. Technical Description.....	4
5. MIB Definition.....	5
6. Security Considerations.....	20
7. Normative References.....	20
8. Non-Normative References.....	22
9. Authors' Addresses.....	22
10. Full Copyright Statement.....	22

1. Introduction

The iFCP protocol provides Fibre Channel fabric functionality on an IP network in which TCP/IP switching and routing elements replace Fibre Channel components. This draft provides a mechanism to monitor and control iFCP Gateway instances, and their associated sessions, using SNMP.

2. The SNMP Management Framework

The SNMP Management Framework presently consists of five major components:

- o An overall architecture, described in [RFC 2571](#) [[RFC2571](#)].
- o Mechanisms for describing and naming objects and events for the purpose of management. The first version of this Structure of Management Information (SMI) is called SMIV1 and described in STD 16, [RFC 1155](#) [[RFC1155](#)], STD 16, [RFC 1212](#) [[RFC1212](#)] and [RFC 1215](#) [[RFC1215](#)]. The second version, called SMIV2, is described in STD 58, [RFC 2578](#) [[RFC2578](#)], STD 58, [RFC 2579](#) [[RFC2579](#)] and STD 58, [RFC 2580](#) [[RFC2580](#)].
- o Message protocols for transferring management information. The first version of the SNMP message protocol is called SNMPv1 and described in STD 15, [RFC 1157](#) [[RFC1157](#)]. A second version of the SNMP message protocol, which is not an Internet standards track protocol, is called SNMPv2c and described in [RFC 1901](#) [[RFC1901](#)] and [RFC 1906](#) [[RFC1906](#)]. The third version of the message protocol is called SNMPv3 and described in [RFC 1906](#) [[RFC1906](#)], [RFC 2572](#) [[RFC2572](#)] and [RFC 2574](#) [[RFC2574](#)].
- o Protocol operations for accessing management information. The first set of protocol operations and associated PDU formats is described in STD 15, [RFC 1157](#) [[RFC1157](#)]. A second set of protocol operations and associated PDU formats is described in [RFC 1905](#) [[RFC1905](#)].
- o A set of fundamental applications described in [RFC 2573](#) [[RFC2573](#)] and the view-based access control mechanism

described in [RFC 2575](#) [[RFC2575](#)].

A more detailed introduction to the current SNMP Management Framework can be found in [RFC 2570](#) [[RFC2570](#)].

Managed objects are accessed via a virtual information store, termed the Management Information Base or MIB. Objects in the MIB are defined using the mechanisms defined in the SMI.

This memo specifies a MIB module that is compliant to the SMIV2. A MIB conforming to the SMIV1 can be produced through the appropriate translations. The resulting translated MIB must be

Gibbons

Expires April 2003

3

Internet Draft

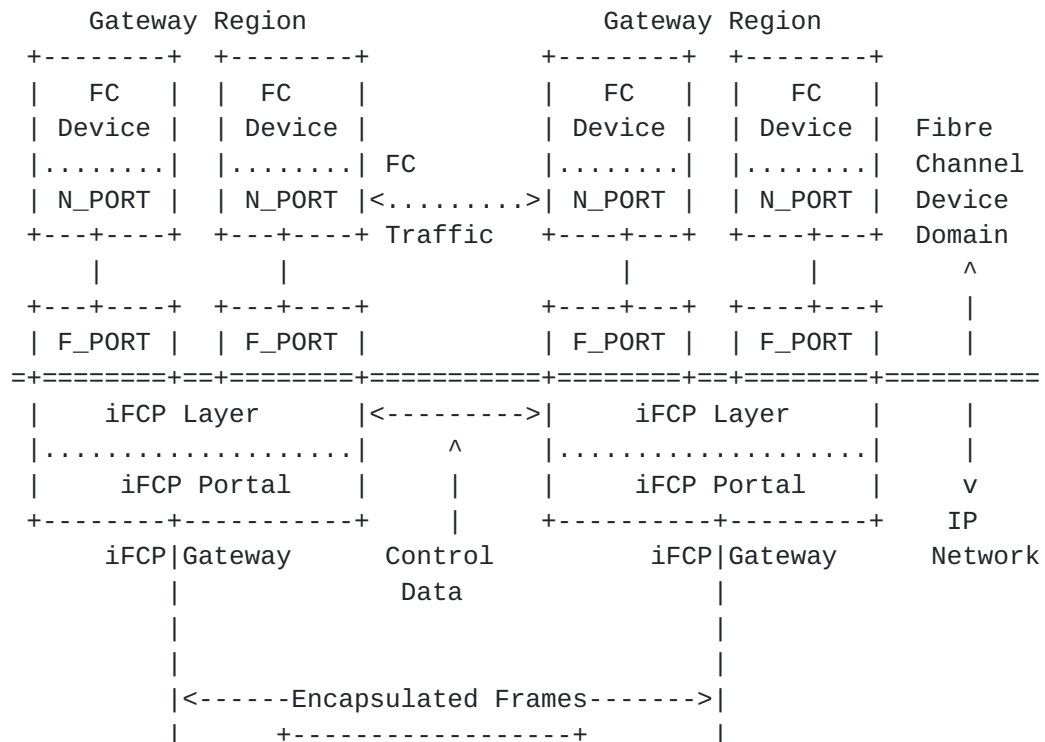
iFCP MIB

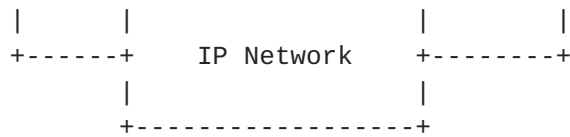
October 2002

semantically equivalent, except where objects or events are omitted because no translation is possible (use of Counter64). Some machine readable information in SMIV2 will be converted into textual descriptions in SMIV1 during the translation process. However, this loss of machine readable information is not considered to change the semantics of the MIB.

3. Overview

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





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

4. Technical Description

The MIB 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. Other standard MIBs, such as the Fibre Management MIB [[FCMGT01](#)], the Interfaces Group MIB [[RFC2863](#)] and

Gibbons	Expires April 2003	4
Internet Draft	iFCP MIB	October 2002

MIB II [[RFC1213](#)] 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.

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.

5. MIB Definition

```

IFCP-MGMT-MIB DEFINITIONS ::= BEGIN
--
--   IETF iFCP Management Information Base (MIB)
--
IMPORTS
    MODULE-IDENTITY,
    OBJECT-TYPE,
    Counter32,
  
```

Counter64,
Integer32,
Unsigned32,
experimental
FROM SNMPv2-SMI

OBJECT-GROUP,
MODULE-COMPLIANCE
FROM SNMPv2-CONF

TEXTUAL-CONVENTION,
TruthValue
FROM SNMPv2-TC

-- From [RFC 2571](#)
SnmpAdminString
FROM SNMP-FRAMEWORK-MIB

-- From [RFC 2851](#)
InetAddressType,
InetAddress
FROM INET-ADDRESS-MIB

-- From IETF Fibre Channel Management MIB, RFC TBD
FcNameIdOrZero,
FcAddressId
FROM FC-MGMT-MIB

Gibbons Expires April 2003 5

Internet Draft iFCP MIB October 2002

;

ifcpMgmtMIB MODULE-IDENTITY
LAST-UPDATED "0210080000Z"
ORGANIZATION "IETF IPS Working Group"
CONTACT-INFO "
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"

DESCRIPTION "The MIB for internet Fibre Channel Protocol
(iFCP) management."

-- an IETF number has not yet been assigned
::= {experimental 4371}

IfIndexType ::= TEXTUAL-CONVENTION
STATUS current
DESCRIPTION "Represents possible interface indexes that
can be used on the iFCP gateway. This can
be used as an index for the IF-MIB ifTable,
if supported by the system, or other
interface table, to obtain additional
information about the interface."
REFERENCE "[RFC 2863](#), The Interfaces Group MIB (IF-MIB)"

Gibbons Expires April 2003 6

Internet Draft iFCP MIB October 2002

SYNTAX Integer32 (1..2147483647)

IfcpVersionType ::= TEXTUAL-CONVENTION
STATUS current
DESCRIPTION "Represents the iFCP version supported."
SYNTAX INTEGER (0..255)

PortType ::= TEXTUAL-CONVENTION
STATUS current
DESCRIPTION "The value for a TCP Port being used for
an iFCP session. The canonical port for
iFCP is 3420."
REFERENCE "[draft-ietf-ips-ifcp-13.txt](#)"

```

SYNTAX          INTEGER (0..65535)

IpTOVor0Type    ::= TEXTUAL-CONVENTION
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       "draft-ietf-ips-ifcp-13.txt"
SYNTAX          INTEGER (0..3600)

LTior0Type      ::= TEXTUAL-CONVENTION
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       "draft-ietf-ips-ifcp-13.txt"
SYNTAX          INTEGER (0..65535)

IfcpSessionStateType ::= TEXTUAL-CONVENTION
STATUS          current
DESCRIPTION     "The value for an iFCP session state."
SYNTAX          INTEGER {down(0), openPending(1), open(2)}

IfcpAddressModeType ::= TEXTUAL-CONVENTION
STATUS          current
DESCRIPTION     "The values for iFCP Address Translation
                 Mode."
REFERENCE       "draft-ietf-ips-ifcp-13.txt"
SYNTAX          INTEGER {addressTransparent(0),
                        addressTranslation(1)}

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

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


Gibbons              Expires April 2003              7

Internet Draft        iFCP MIB                        October 2002

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

ifcpLclGatewayObjInfo OBJECT IDENTIFIER ::= {ifcpGatewayObj 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 controled. This table contains an entry for each
    local iFCP Gateway instance that is being managed."
    ::= {ifcpLclGatewayObjInfo 1}
```

```
ifcpLclGtwyInstEntry OBJECT-TYPE
    SYNTAX          IfcpLclGtwyInstEntry
    MAX-ACCESS      not-accessible
    STATUS          current
    DESCRIPTION
    "An entry in the local iFCP Gateway Instance table.
    Parameters and settings for the gateway are found here."
    INDEX { ifcpLclGtwyInstIndex }
    ::= {ifcpLclGtwyInstTable 1}
```

```
IfcpLclGtwyInstEntry ::= SEQUENCE {
    ifcpLclGtwyInstIndex      Unsigned32,
    ifcpLclGtwyInstPhyIndex   Unsigned32,
    ifcpLclGtwyInstVersionMin IfcpVersionType,
    ifcpLclGtwyInstVersionMax IfcpVersionType,
    ifcpLclGtwyInstAddrTransMode IfcpAddressModeType,
    ifcpLclGtwyInstFcBrdcstSupport TruthValue,
    ifcpLclGtwyInstDefaultIpTOV IpTOVor0Type,
    ifcpLclGtwyInstDefaultLTInterval LTIor0Type,
    ifcpLclGtwyInstDescr      SnmpAdminString,
    ifcpLclGtwyInstNumActiveSessions Unsigned32
}
```

```
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          Unsigned32 (0..2147483647)
    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 2), for this iFCP Gateway. If not supported it is either an index into a chassis MIB, as supported by the system, or 0."

REFERENCE ["RFC 2737](#), Entity MIB (Version 2)"

::= {ifcpLclGtwyInstEntry 2}

ifcpLclGtwyInstVersionMin OBJECT-TYPE

SYNTAX IfcpVersionType

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The minimum iFCP protocol version supported by the local iFCP gateway instance."

REFERENCE ["draft-ietf-ips-ifcp-13.txt"](#)

::= {ifcpLclGtwyInstEntry 3}

ifcpLclGtwyInstVersionMax OBJECT-TYPE

SYNTAX IfcpVersionType

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The maximum iFCP protocol version supported by the local iFCP gateway instance."

REFERENCE ["draft-ietf-ips-ifcp-13.txt"](#)

::= {ifcpLclGtwyInstEntry 4}

ifcpLclGtwyInstAddrTransMode OBJECT-TYPE

SYNTAX IfcpAddressModeType

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"The local iFCP gateway operating mode. Changing this value may cause existing sessions to be disrupted."

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."

DEFVAL { false }

::= {ifcpLclGtwyInstEntry 6}

ifcpLclGtwyInstDefaultIpTOV OBJECT-TYPE

SYNTAX IpTOVOr0Type

```

        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

Gibbons                      Expires April 2003                      9

Internet Draft              iFCP MIB                                October 2002

        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."
        DEFVAL          { 6 }
        ::= { ifcpLclGtwyInstEntry      7}

ifcpLclGtwyInstDefaultLTInterval OBJECT-TYPE
    SYNTAX              LTior0Type
    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."
    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              Unsigned32 (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}

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

```

--

ifcpNportSessionInfo OBJECT IDENTIFIER ::= {ifcpGatewayObj 2}

ifcpSessionAttributesTable OBJECT-TYPE

SYNTAX	SEQUENCE OF
	IfcpSessionAttributesEntry
MAX-ACCESS	not-accessible
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

Gibbons Expires April 2003 10

Internet Draft iFCP MIB October 2002

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	IfIndexType,
ifcpSessionLclPrtlAddrType	InetAddressType,
ifcpSessionLclPrtlAddr	InetAddress,
ifcpSessionLclPrtlTcpPort	PortType,
ifcpSessionLclNpWwun	FcNameIdOrZero,
ifcpSessionLclNpFcId	FcAddressId,
ifcpSessionRmtNpWwun	FcNameIdOrZero,
ifcpSessionRmtPrtlIfAddrType	InetAddressType,
ifcpSessionRmtPrtlIfAddr	InetAddress,
ifcpSessionRmtPrtlTcpPort	PortType,
ifcpSessionRmtNpFcId	FcAddressId,
ifcpSessionRmtNpFcIdAlias	FcAddressId,
ifcpSessionIpTOV	IpTOVor0Type,
ifcpSessionLclLTIntvl	LTIOR0Type,
ifcpSessionRmtLTIntvl	LTIOR0Type,
ifcpSessionBound	TruthValue

 }

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}

ifcpSessionLclPrtlIfIndex	OBJECT-TYPE
SYNTAX	IfIndexType
MAX-ACCESS	read-only
STATUS	current
DESCRIPTION	

"This is the local interface in the ifTable being used as the local portal in this session, as described in the IF-MIB. This can be used as an index for the ifTable to obtain

Gibbons	Expires April 2003	11
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Internet Draft	iFCP MIB	October 2002
----------------	----------	--------------

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."

::= {ifcpSessionAttributesEntry 4}

ifcpSessionLclPrtlTcpPort	OBJECT-TYPE
SYNTAX	PortType
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."

::= {ifcpSessionAttributesEntry 5}

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

"World Wide Unique Name of the local N Port. For an unbound session this variable will be empty."

DEFVAL { "" }

::= {ifcpSessionAttributesEntry 6}

ifcpSessionLclNpFcId	OBJECT-TYPE
SYNTAX	FcAddressId
MAX-ACCESS	read-only
STATUS	current
DESCRIPTION	

"Fibre Channel Identifier of the local N Port. For an unbound session this variable will be empty"

::= {ifcpSessionAttributesEntry 7}

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

Gibbons	Expires April 2003	12
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Internet Draft	iFCP MIB	October 2002
----------------	----------	--------------

DESCRIPTION

"World Wide Unique Name of the remote N Port. For an unbound session this variable will be empty."

DEFVAL { "" }

::= {ifcpSessionAttributesEntry 8}

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

"The type of address in ifcpSessionRmtPrtlIfAddr."

::= {ifcpSessionAttributesEntry 9}

ifcpSessionRmtPrtlIfAddr	OBJECT-TYPE
SYNTAX	InetAddress
MAX-ACCESS	read-only

STATUS	current
DESCRIPTION	
"This is the remote gateway IP address being used for the portal on the remote iFCP gateway."	
::= {ifcpSessionAttributesEntry 10}	
ifcpSessionRmtPrtlTcpPort	OBJECT-TYPE
SYNTAX	PortType
MAX-ACCESS	read-only
STATUS	current
DESCRIPTION	
"This is the TCP port number being used for the portal on the remote iFCP gateway. Generally, this will be the iFCP canonical port."	
DEFVAL	{ 3420 }
::= {ifcpSessionAttributesEntry 11}	
ifcpSessionRmtNpFcid	OBJECT-TYPE
SYNTAX	FcAddressId
MAX-ACCESS	read-only
STATUS	current
DESCRIPTION	
"Fibre Channel Identifier of the remote N Port. For an unbound session this variable will be empty."	
::= {ifcpSessionAttributesEntry 12}	
ifcpSessionRmtNpFcidAlias	OBJECT-TYPE
SYNTAX	FcAddressId
MAX-ACCESS	read-only
STATUS	current
DESCRIPTION	
"Fibre Channel Identifier Alias assigned by the local gateway for the remote N Port. For an unbound session this variable will be empty."	
::= {ifcpSessionAttributesEntry 13}	

ifcpSessionIpTOV	OBJECT-TYPE
------------------	-------------

Gibbons	Expires April 2003	13
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Internet Draft	iFCP MIB	October 2002
----------------	----------	--------------

SYNTAX	IpTOVor0Type
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."

::= {ifcpSessionAttributesEntry 14}

ifcpSessionLclLTIntvl	OBJECT-TYPE
SYNTAX	LTIOR0Type
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. A value of 0 implies that the gateway will not originate Liveness Test messages for the session."

::= {ifcpSessionAttributesEntry 15}

ifcpSessionRmtLTIntvl	OBJECT-TYPE
SYNTAX	LTIOR0Type
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."

::= {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."

::= {ifcpSessionAttributesEntry 17}

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

Gibbons Expires April 2003 14

Internet Draft iFCP MIB October 2002

ifcpSessionStatsTable	OBJECT-TYPE
-----------------------	-------------

SYNTAX	SEQUENCE OF
	IfcpSessionStatsEntry
MAX-ACCESS	not-accessible
STATUS	current
DESCRIPTION	
"This table provides statistics on an iFCP session."	
::= {ifcpNportSessionInfo 2}	

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

IfcpSessionStatsEntry ::= SEQUENCE {	
ifcpSessionState	IfcpSessionStateType,
ifcpSessionDuration	Unsigned32,
ifcpSessionTxFrames	Counter64,
ifcpSessionRxFrames	Counter64,
ifcpSessionStaleFrames	Counter64,
ifcpSessionHeaderCRCErrors	Counter64,
ifcpSessionFcPayloadCRCErrors	Counter64,
ifcpSessionOtherErrors	Counter64
	}

ifcpSessionState	OBJECT-TYPE
SYNTAX	IfcpSessionStateType
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}	

ifcpSessionTxFrames	OBJECT-TYPE
SYNTAX	Counter64
MAX-ACCESS	read-only
STATUS	current
DESCRIPTION	

"The total number of iFCP frames transmitted since the connection was first established."

Gibbons

Expires April 2003

15

Internet Draft

iFCP MIB

October 2002

::= {ifcpSessionStatsEntry 3}

ifcpSessionRxFrames	OBJECT-TYPE
SYNTAX	Counter64
MAX-ACCESS	read-only
STATUS	current
DESCRIPTION	

"The total number of iFCP frames received since the connection was first established."

::= {ifcpSessionStatsEntry 4}

ifcpSessionStaleFrames	OBJECT-TYPE
SYNTAX	Counter64
MAX-ACCESS	read-only
STATUS	current
DESCRIPTION	

"The total number of received iFCP frames that were stale and discarded since the connection was first established."

::= {ifcpSessionStatsEntry 5}

ifcpSessionHeaderCRCErrors	OBJECT-TYPE
SYNTAX	Counter64
MAX-ACCESS	read-only
STATUS	current
DESCRIPTION	

"The total number of CRC errors that occurred in the frame header, detected since the connection was first established. Usually, a single Header CRC error is sufficient to terminate an iFCP session."

::= {ifcpSessionStatsEntry 6}

ifcpSessionFcPayloadCRCErrors	OBJECT-TYPE
SYNTAX	Counter64
MAX-ACCESS	read-only
STATUS	current
DESCRIPTION	

"The total number of CRC errors that occurred in the Fibre Channel frame payload detected since the connection was first established."

::= {ifcpSessionStatsEntry 7}

ifcpSessionOtherErrors	OBJECT-TYPE
SYNTAX	Counter64
MAX-ACCESS	read-only

```

        STATUS                                current
        DESCRIPTION
        "The total number of errors, other then errors explicitly
        measured, detected since the connection was first established."
        ::= {ifcpSessionStatsEntry 8}

--
-- Low Capacity Statistics
--

Gibbons                                Expires April 2003                                16

Internet Draft                        iFCP MIB                                October 2002

ifcpSessionLcStatsTable                OBJECT-TYPE
    SYNTAX                            SEQUENCE OF
                                        IfcpSessionLcStatsEntry
    MAX-ACCESS                        not-accessible
    STATUS                            current
    DESCRIPTION
    "This table provides low capacity statistics on an iFCP session.
    This is provided for backward compatibility with systems that
    do not support Counter64."
    ::= {ifcpNportSessionInfo 3}

ifcpSessionLcStatsEntry                OBJECT-TYPE
    SYNTAX                            IfcpSessionLcStatsEntry
    MAX-ACCESS                        not-accessible
    STATUS                            current
    DESCRIPTION
    "iFCP specific statistics per session."
    AUGMENTS {ifcpSessionAttributesEntry}
    ::= {ifcpSessionLcStatsTable 1}

IfcpSessionLcStatsEntry ::= SEQUENCE {
    ifcpSessionLcTxFrames                Counter32,
    ifcpSessionLcRxFrames                Counter32,
    ifcpSessionLcStaleFrames              Counter32,
    ifcpSessionLcHeaderCRCErrors          Counter32,
    ifcpSessionLcFcPayloadCRCErrors       Counter32,
    ifcpSessionLcOtherErrors              Counter32
}

ifcpSessionLcTxFrames                  OBJECT-TYPE
    SYNTAX                            Counter32
    MAX-ACCESS                        read-only
    STATUS                            current
    DESCRIPTION
    "The total number of iFCP frames transmitted since the
    connection was first established."

```

::= {ifcpSessionLcStatsEntry 1}

ifcpSessionLcRxFrames	OBJECT-TYPE
SYNTAX	Counter32
MAX-ACCESS	read-only
STATUS	current
DESCRIPTION	

"The total number of iFCP frames received since the connection was first established."

::= {ifcpSessionLcStatsEntry 2}

ifcpSessionLcStaleFrames	OBJECT-TYPE
SYNTAX	Counter32
MAX-ACCESS	read-only
STATUS	current
DESCRIPTION	

"The total number of received iFCP frames that were stale and discarded since the connection was first established."

Gibbons	Expires April 2003	17
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Internet Draft	iFCP MIB	October 2002
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::= {ifcpSessionLcStatsEntry 3}

ifcpSessionLcHeaderCRCErrors	OBJECT-TYPE
SYNTAX	Counter32
MAX-ACCESS	read-only
STATUS	current
DESCRIPTION	

"The total number of CRC errors that occurred in the frame header, detected since the connection was first established. Usually, a single Header CRC error is sufficient to terminate an iFCP session."

::= {ifcpSessionLcStatsEntry 4}

ifcpSessionLcFcPayloadCRCErrors	OBJECT-TYPE
SYNTAX	Counter32
MAX-ACCESS	read-only
STATUS	current
DESCRIPTION	

"The total number of CRC errors that occurred in the Fibre Channel frame payload detected since the connection was first established."

::= {ifcpSessionLcStatsEntry 5}

ifcpSessionLcOtherErrors	OBJECT-TYPE
SYNTAX	Counter32
MAX-ACCESS	read-only
STATUS	current
DESCRIPTION	

"The total number of errors, other than errors explicitly
measured, detected since the connection was first established."
 ::= {ifcpSessionLcStatsEntry 6}

--=====

ifcpGroups OBJECT IDENTIFIER ::= {ifcpGatewayConformance 1}

ifcpLclGatewayGroup OBJECT-GROUP

OBJECTS {
 ifcpLclGtwyInstPhyIndex,
 ifcpLclGtwyInstVersionMin,
 ifcpLclGtwyInstVersionMax,
 ifcpLclGtwyInstAddrTransMode,
 ifcpLclGtwyInstFcBrdcstSupport,
 ifcpLclGtwyInstDefaultIpTOV,
 ifcpLclGtwyInstDefaultLTInterval,
 ifcpLclGtwyInstDescr,
 ifcpLclGtwyInstNumActiveSessions
}
STATUS current
DESCRIPTION
 "iFCP local device info group"
 ::= {ifcpGroups 1}

ifcpLclGatewaySessionGroup OBJECT-GROUP

Gibbons Expires April 2003 18

Internet Draft iFCP MIB October 2002

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

```

        "iFCP Session group"
        ::= {ifcpGroups 4}

ifcpLclGatewaySessionStatsGroup OBJECT-GROUP
    OBJECTS {
        ifcpSessionState,
        ifcpSessionDuration,
        ifcpSessionTxFrames,
        ifcpSessionRxFrames,
        ifcpSessionStaleFrames,
        ifcpSessionHeaderCRCErrors,
        ifcpSessionFcPayloadCRCErrors,
        ifcpSessionOtherErrors
    }
    STATUS current
    DESCRIPTION
        "iFCP Session Statistics group"
        ::= {ifcpGroups 5}

ifcpLclGatewaySessionLcStatsGroup OBJECT-GROUP
    OBJECTS {
        ifcpSessionLcTxFrames,
        ifcpSessionLcRxFrames,
        ifcpSessionLcStaleFrames,
        ifcpSessionLcHeaderCRCErrors,
        ifcpSessionLcFcPayloadCRCErrors,
        ifcpSessionLcOtherErrors
    }
    STATUS current
    DESCRIPTION
        "iFCP Session Low Capacity Statistics group"
        ::= {ifcpGroups 6}

ifcpCompliances OBJECT IDENTIFIER ::= {ifcpGatewayConformance 2}

Gibbons                               Expires April 2003                               19

Internet Draft                        iFCP MIB                                           October 2002

ifcpGatewayComplianceV1 MODULE-COMPLIANCE
    STATUS current
    DESCRIPTION
        "Minimum implementation for iFCP MIB compliance."
    MODULE      -- this module
    MANDATORY-GROUPS {
        ifcpLclGatewayGroup
    }
    ::= {ifcpCompliances 1}

END

```

6. Security Considerations

There are a number of management objects defined in this MIB that have 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.

SNMPv1 by itself is not a secure environment. 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.

It is recommended that the implementers consider the security features as provided by the SNMPv3 framework. Specifically, the use of the User-based Security Model [RFC 2574](#) [[RFC2574](#)] and the View-based Access Control Model [RFC 2575](#) [[RFC2575](#)] is recommended.

It is then a customer/user responsibility to ensure that the SNMP entity giving access to an instance of this MIB, 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 2003	20
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Internet Draft	iFCP MIB	October 2002
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Gibbons Expires April 2003 22

Internet Draft iFCP MIB October 2002

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Gibbons

Expires April 2003

23