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Definitions of Managed Objects for  
Internet Fibre Channel Protocol (iFCP)

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

The iFCP protocol (RFC 4172) 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 document provides a mechanism to monitor and control iFCP Gateway instances, and their associated sessions, using SNMP.

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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 of an interconnect between iFCP gateways.

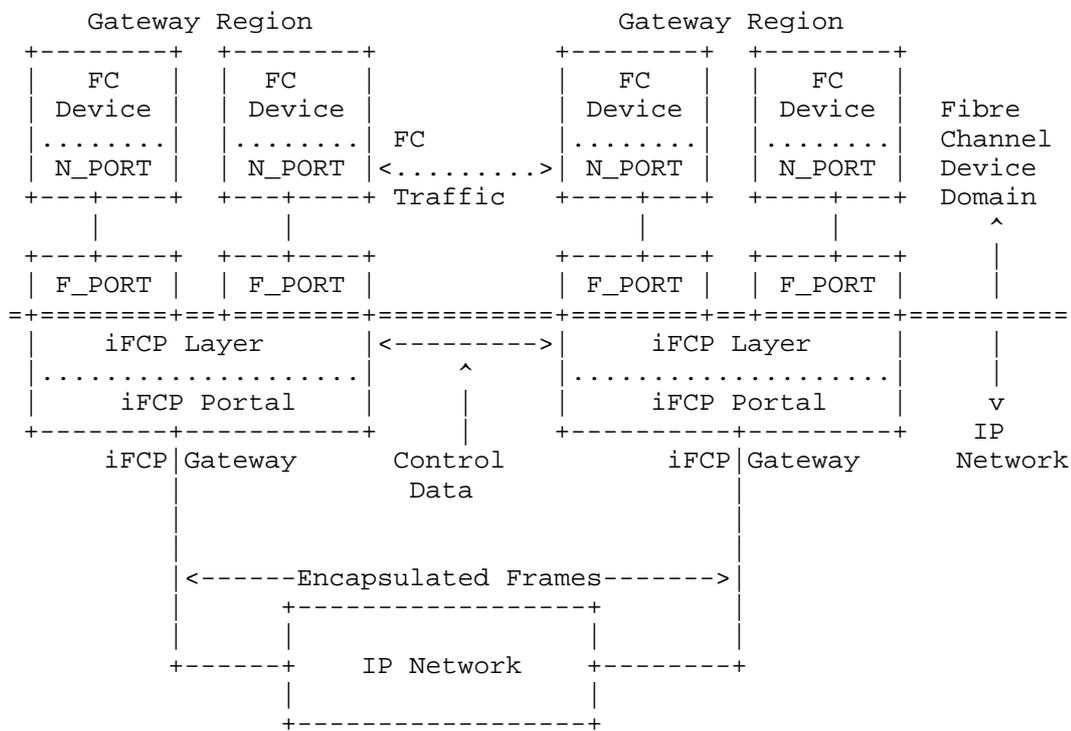


Figure 1: Interconnect between iFCP Gateways

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.

### 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 use 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 use 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  
        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 "200601170000Z"
  ORGANIZATION "IETF IPS Working Group"
  CONTACT-INFO "
    Attn: Kevin Gibbons
             McDATA Corporation
             4555 Great America Pkwy
             Santa Clara, CA 95054-1208 USA
             Phone: (408) 567-5765
             EMail: kevin.gibbons@mcddata.com
```

```
    Charles Monia
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             San Jose, CA 95135 USA
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```
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             Riverbed Technology
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```
    Franco Travostino
             Nortel
             600 Technology Park Drive
             Billerica, MA 01821 USA
             Phone: (978) 288-7708
             EMail: travos@nortel.com"
```

DESCRIPTION

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

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```
  REVISION      "200601170000Z"
  DESCRIPTION
```

"Initial version of iFCP Management Module.  
This MIB published as RFC 4369."

::= { transmission 230 }

--  
--  
--

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)

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.
    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)
    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, then
    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
                    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 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

```



```

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}
```

```

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
"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  
 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. The address type is  
 defined in ifcpSessionRmtPrtlIfAddrType. If the value is a  
 DNS name, then the name is resolved once, during the initial  
 session instantiation."  
 ::= {ifcpSessionAttributesEntry 10}

ifcpSessionRmtPrtlTcpPort OBJECT-TYPE  
 SYNTAX InetPortNumber  
 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. The value may be 0 during an initial setup  
 period."  
 DEFVAL { 3420 }  
 ::= {ifcpSessionAttributesEntry 11}

ifcpSessionRmtNpFcid OBJECT-TYPE  
 SYNTAX FcAddressIdOrZero  
 MAX-ACCESS read-only  
 STATUS current  
 DESCRIPTION  
 "Fibre Channel Identifier of the remote N Port. For an  
 unbound session, this variable will be a zero-length string."  
 REFERENCE "RFC 4172, iFCP Protocol Specification"  
 ::= {ifcpSessionAttributesEntry 12}

ifcpSessionRmtNpFcidAlias OBJECT-TYPE  
 SYNTAX FcAddressIdOrZero

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 a zero-length string."

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. 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, then 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

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
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

"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."

::= {ifcpSessionStatsEntry 8}

ifcpSessionFcPayloadCRCErrors OBJECT-TYPE  
 SYNTAX ZeroBasedCounter64  
 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. 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 9}

ifcpSessionOtherErrors OBJECT-TYPE  
 SYNTAX ZeroBasedCounter64  
 MAX-ACCESS read-only  
 STATUS current  
 DESCRIPTION

"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."

::= {ifcpSessionStatsEntry 10}

ifcpSessionDiscontinuityTime OBJECT-TYPE  
 SYNTAX TimeStamp  
 MAX-ACCESS read-only  
 STATUS current  
 DESCRIPTION

"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,
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
1-Gbps 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
}

```

```

ifcpSessionLcTxOctets          OBJECT-TYPE
    SYNTAX                      ZeroBasedCounter32
    MAX-ACCESS                  read-only
    STATUS                      current
    DESCRIPTION
        "The total number of octets transmitted by the iFCP gateway
        for this session."
        ::= {ifcpSessionLcStatsEntry 1}

ifcpSessionLcRxOctets          OBJECT-TYPE
    SYNTAX                      ZeroBasedCounter32
    MAX-ACCESS                  read-only
    STATUS                      current
    DESCRIPTION
        "The total number of octets received by the iFCP gateway for
        this session."
        ::= {ifcpSessionLcStatsEntry 2}

ifcpSessionLcTxFrames          OBJECT-TYPE
    SYNTAX                      ZeroBasedCounter32
    MAX-ACCESS                  read-only
    STATUS                      current
    DESCRIPTION
        "The total number of iFCP frames transmitted by the gateway
        for this session."
        ::= {ifcpSessionLcStatsEntry 3}

ifcpSessionLcRxFrames          OBJECT-TYPE
    SYNTAX                      ZeroBasedCounter32
    MAX-ACCESS                  read-only
    STATUS                      current
    DESCRIPTION
        "The total number of iFCP frames received by the gateway
        for this session."
        ::= {ifcpSessionLcStatsEntry 4}

ifcpSessionLcStaleFrames       OBJECT-TYPE
    SYNTAX                      ZeroBasedCounter32
    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."
        ::= {ifcpSessionLcStatsEntry 5}

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
    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
    }

    OBJECT          ifcpSessionLclPrtlAddrType
    SYNTAX          InetAddressType { ipv4(1), ipv6(2) }
    DESCRIPTION
        "Support is only required for global IPv4

```

and IPv6 address types."

```
OBJECT      ifcpSessionRmtPrtlIfAddrType
SYNTAX      InetAddressType { ipv4(1), ipv6(2) }
DESCRIPTION
    "Support is only required for global IPv4
    and IPv6 address types."
```

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

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

```
ifcpLclGatewayGroup OBJECT-GROUP
```

```
OBJECTS {
    ifcpLclGtwyInstPhyIndex,
    ifcpLclGtwyInstVersionMin,
    ifcpLclGtwyInstVersionMax,
    ifcpLclGtwyInstAddrTransMode,
    ifcpLclGtwyInstFcBrdcstSupport,
    ifcpLclGtwyInstDefaultIpTOV,
    ifcpLclGtwyInstDefaultLTInterval,
    ifcpLclGtwyInstDescr,
    ifcpLclGtwyInstNumActiveSessions,
    ifcpLclGtwyInstStorageType
}
STATUS current
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-
    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 that do not support Counter64-based data types, or that need to support SNMPv1 applications."  
 ::= {ifcpGroups 6}

END

## 5. IANA Considerations

The IANA has made a unique MIB OID assignment under the transmission branch for IFCP-MGMT-MIB.

## 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
```

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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#### 8. Informative References

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