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

Abstract

This document defines Management Information Base (MIB) objects to
monitor and control the Internet Fibre Channel Protocol (iFCP)
gateway instances and their associated sessions, for use with network
management protocols.

This document obsoletes RFC 4369.

Status of This Memo

This is an Internet Standards Track document.

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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].

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

iFCP (RFC 4172 [RFC4172]) provides Fibre Channel fabric functionality on an IP network in which TCP/IP switching and routing elements replace Fibre Channel components. iFCP is used between iFCP gateways. This 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](image-url)

The iFCP MIB module is designed to allow a network management protocol such as 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 high-capacity (Counter64) and low-capacity (Counter32) methods.

The following MIB module imports from 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], ENTITY-MIB (v3) [RFC4133], and RMON2-MIB [RFC4502].

4. Differences from RFC 4369

As explained in [RFC6172], the iFCP address translation mode is deprecated. This document obsoletes the iFCP MIB module [RFC4369] for this change.
5. 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 4502
   ZeroBasedCounter32
      FROM RMON2-MIB

   -- From RFC 2856
   ZeroBasedCounter64
      FROM HCNUM-TC

   -- From RFC 2863
   InterfaceIndexOrZero
      FROM IF-MIB

   -- From RFC 3411
   SnmpAdminString
      FROM SNMP-FRAMEWORK-MIB

   -- From RFC 4001
   InetAddressType,
   InetAddress,
   InetPortNumber
      FROM INET-ADDRESS-MIB
 Venkatesen                   Standards Track                    [Page 6]
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)

IfcpLTitorZero ::= 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 6172, Deprecation of iFCP Address Translation Mode"
   SYNTAX INTEGER {addressTransparent(1), addressTranslation(2)}
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,
  ifcpLclGtwyInstDefaultLTIorZero  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}

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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;
RFC 6172, Deprecation of iFCP Address
Translation Mode"
DEFVAL { addressTransparent }
::= {ifcpLclGtwyInstEntry 5}
ifcpLclGtwyInstFcBrdcstSupport OBJECT-TYPE
SYNTAX            TruthValue
MAX-ACCESS        read-write
STATUS            current
DESCRIPTION "This value indicates 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
UNITS             "seconds"
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
UNITS             "seconds"
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
STATUS current
DESCRIPTION
"Each entry contains information about one iFCP session consisting of a pair of N_PORTS joined by a single TCP/IP connection. This table’s INDEX includes ifcpLclGtwyInstIndex, which identifies the local iFCP gateway instance that created the session for the entry.

Soon after an entry is created in this table for an iFCP session, it will correspond to an entry in the tcpConnectionTable of the TCP-MIB (RFC 4022). The corresponding entry might represent a preexisting TCP connection, or it might be a newly created entry. (Note that if IPv4 is being used, an entry in RFC 2012’s tcpConnTable may also correspond.) The values of ifcpSessionLclPrtlAddrType and ifcpSessionRmtPrtlIfAddrType in this table and the values of tcpConnectionLocalAddressType and tcpConnectionRemAddressType used as INDEX values for the corresponding entry in the tcpConnectionTable should be the same; this makes it simpler to locate a session’s TCP connection in the TCP-MIB. (Of course, all four values need to be ‘ipv4’ if there’s a corresponding entry in the tcpConnTable.)

If an entry is created in this table for a session, prior to knowing which local and/or remote port numbers will be used for the TCP connection, then ifcpSessionLclPrtlTcpPort and/or ifcpSessionRmtPrtlTcpPort have the value zero until such time as they can be updated to the port numbers (to be) used for the connection. (Thus, a port value of zero should not be used to locate a session’s TCP connection in the TCP-MIB.)

When the TCP connection terminates, the entry in the tcpConnectionTable and the entry in this table both get deleted (and, if applicable, so does the entry in the tcpConnTable).

INDEX { ifcpLclGtwyInstIndex, ifcpSessionIndex }

::= {ifcpSessionAttributesTable 1}
```

```
IfcpSessionAttributesEntry ::= SEQUENCE {
  ifcpSessionIndex INTEGER,
  ifcpSessionLclPrtlIfIndex INTERFACEINDEXORZERO,
  ifcpSessionLclPrtlAddrType INETADDRESSTYPE,
  ...
}
```
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 a complex index that would be difficult to implement.

::= {ifcpSessionAttributesEntry 1}

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}

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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}

ifcpSessionLclNpFcSid OBJECT-TYPE
SYNTAX FcAddressIdOrZero
MAX-ACCESS read-only
STATUS current
"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
UNITS                          "seconds"
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
UNITS                          "seconds"
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
UNITS "seconds"
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}

ifcpSessionHeaderCRC_Errors
  OBJECT-TYPE
  SYNTAX ZeroBasedCounter64
  MAX-ACCESS read-only
  STATUS current
  DESCRIPTION
  "The total number of Cyclic Redundancy Check (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}

ifcpSessionFcPayloadCRC_Errors
  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 deprecated
DESCRIPTION
"This MODULE-COMPLIANCE has been deprecated because address translation mode has been deprecated in the iFCP standard. It has the implementation requirements for iFCP MIB module 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."

OBJECT ifcpLclGtwyInstAddrTransMode
SYNTAX IfcpAddressMode {addressTransparent(1),
  addressTranslation(2)}
DESCRIPTION
"This object must support addressTransparent(1) and addressTranslation(2)."

::= {ifcpCompliances 1}

ifcpGatewayComplianceNoTranslation MODULE-COMPLIANCE
STATUS current
DESCRIPTION
"Implementation requirements for iFCP MIB module compliance. Address translation mode has been deprecated in the iFCP standard."
REFERENCE
  "RFC 4172, iFCP Protocol Specification;
   RFC 6172, Deprecation of iFCP Address Translation Mode"

MODULE -- this module
MANDATORY-GROUPS {
    ifcpLclGatewayGroup,
    ifcpLclGatewaySessionGroupNoTranslation,
    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."

OBJECT ifcpLclGtwyInstAddrTransMode
SYNTAX IfcpAddressMode {addressTransparent(1)}
DESCRIPTION "Support is only required for addressTransparent(1)."

 ::= {ifcpCompliances 2}

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 deprecated
  DESCRIPTION
"This OBJECT-GROUP has been deprecated because address translation mode has been deprecated in the iFCP standard. 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
"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

"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}

ifcpLclGatewaySessionGroupNoTranslation OBJECT-GROUP
OBJECTS {
  ifcpSessionLclPrt1IfIndex,
  ifcpSessionLclPrt1AddrType,
  ifcpSessionLclPrt1Addr,
  ifcpSessionLclPrt1TcpPort,
  ifcpSessionLclNpWwun,
  ifcpSessionLclNpFcid,
  ifcpSessionRmtNpWwun,
  ifcpSessionRmtNpFcid,
  ifcpSessionRmtPrt1IfAddrType,
  ifcpSessionRmtPrt1IfAddr,
  ifcpSessionRmtPrt1TcpPort,
  ifcpSessionRmtNpFcId,
  ifcpSessionIpTOV,
  ifcpSessionLclLTIntvl,
  ifcpSessionRmtLTIntvl,
  ifcpSessionBound,
  ifcpSessionStorageType
}
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 the SNMPv3 cryptographic mechanisms (for authentication and privacy).

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

7. IANA Considerations

The MIB module in this document uses the following IANA-assigned OBJECT IDENTIFIER value recorded in the SMI Numbers registry:

<table>
<thead>
<tr>
<th>Descriptor</th>
<th>OBJECT IDENTIFIER value</th>
</tr>
</thead>
<tbody>
<tr>
<td>ifcpMgmtMIB</td>
<td>{ transmission 230 }</td>
</tr>
</tbody>
</table>

8. References

8.1. Normative References


8.2. Informative References

9. Acknowledgments

Credit goes to the authors of [RFC4369] (listed below) for preparing the first version of the iFCP MIB module. I wish to thank David Black, Tom Talpey, and David Harrington for their significant inputs on this update.

Authors of RFC 4369:

Kevin Gibbons
2Wire Corporation
1704 Automation Parkway
San Jose, CA 95131 USA
Phone: (408) 895-1387
EMail: kgibbons@yahoo.com

Charles Monia
Consultant
7553 Morevern Circle
San Jose, CA 95135 USA
EMail: charles_monia@yahoo.com

Josh Tseng
Riverbed Technology
501 2nd Street, Suite 410
San Francisco, CA 94107 USA
Phone: (650) 274-2109
EMail: joshtseng@yahoo.com

Franco Travostino
eBay Inc.
2145 Hamilton Avenue
San Jose, CA 95125
EMail: travos@ieee.org

Author’s Address

Prakash Venkatesen (editor)
HCL Technologies Ltd.
50-53, Greams Road,
Chennai – 600006
India
EMail: prakashvn@hcl.com