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.
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.

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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:

- An overall architecture, described in RFC 2571 [RFC2571].
- 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].
- 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].
- 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].
- 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
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
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
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ifcpMgmtMIB  MODULE-IDENTITY
LAST-UPDATED "0210080000Z"
ORGANIZATION "IETF IPS Working Group"
CONTACT-INFO "
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email : travos@nortelnetworks.com"

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)"
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}
-- 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
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
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 a 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
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
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
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 =========
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."
::= {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 than errors explicitly measured, detected since the connection was first established."
::= {ifcpSessionStatsEntry 8}

--
-- Low Capacity Statistics
--
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."
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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}

ifcpSessionLcFcPayloadCRC ERRors 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

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OBJECTS {
  ifcpSessionLclPrtlIfIndex,
  ifcpSessionLclPrtlAddrType,
  ifcpSessionLclPrtlAddr,
  ifcpSessionLclPrtlTcpPort,
  ifcpSessionLclNpWwwn,
  ifcpSessionLclNpFcId,
  ifcpSessionRmtNpWwwn,
  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}
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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