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Expires: April 2002

Infiniband Connection MIB

1. Status of this Memo

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- 2. 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 objects for managing the InfiniBand Connection Manager (<u>http://www.infinibandta.org</u>)

Strahm	Internet Draft - Expires April 2002	1
	Infiniband Connection MIB	Oct 2001

Table of Contents

<u>1</u> .	Status of this Memo	1
<u>2</u> .	Abstract	1
<u>3</u> .	The SNMP Management Framework	3
<u>4</u> .	Conventions used in this document	4
<u>5</u> .	Overview	4
5.3	1. Unreliable Datagram Table	4

The list of current Internet-Drafts can be accessed at http://www.ietf.org/ietf/1id-abstracts.txt

<u>5.2</u> .	Reliable Datagram Table4
<u>5.3</u> .	Connection Table5
<u>6</u> . Ne>	<pre>kt Steps</pre>
<u>7</u> . Def	finitions
<u>8</u> . Sec	curity Considerations <u>15</u>
<u>9</u> . Int	tellectual Property
<u>10</u> . F	References
<u>11</u> . /	Author's Addresses

Strahm	Internet Draft- Expires April 2002	2
	Infiniband Connection MIB	Oct 2001

3. The SNMP Management Framework

The SNMP Management Framework presently consists of five major components:

- o An overall architecture, described in <u>RFC 2571[RFC2571]</u>.
- 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, <u>RFC 1155[RFC1155]</u>, STD 16, <u>RFC 1212</u> [<u>RFC1212]</u> and <u>RFC 1215</u> [<u>RFC1215]</u>. The second version, called SMIv2, is described in STD 58, <u>RFC 2578[RFC2578]</u>, STD 58, <u>RFC 2579[RFC2579]</u>, and STD 58, <u>RFC 2580[RFC2580]</u>.
- Message protocols for transferring management information. The first version of the SNMP message protocol is called SNMPv1 and described in STD 15, <u>RFC 1157[RFC1157]</u>. A second version of the SNMP message protocol, which is not an Internet standards track protocol, is called SNMPv2c and described in <u>RFC 1901[RFC1901]</u> and <u>RFC 1906[RFC1906]</u>. The third version of the message protocol is called SNMPv3 and described in <u>RFC 1906[RFC1906]</u>, <u>RFC 2572[RFC2572]</u> and <u>RFC 2574[RFC2574]</u>.
- Protocol operations for accessing management information. The first set of protocol operations and associated PDU formats is described in STD 15, <u>RFC 1157[RFC1157]</u>. A second set of protocol operations and associated PDU formats is described in <u>RFC 1905[RFC1905]</u>.
- A set of fundamental applications described in <u>RFC</u> <u>2573[RFC2573]</u> and the view-based access control mechanism described in <u>RFC 2575[RFC2575]</u>.

A more detailed introduction to the current SNMP Management Framework can be found in <u>RFC 2570[RFC2570]</u>.

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.

Strahm	Internet Draft- Expires April 2002	3
	Infiniband Connection MIB	Oct 2001

4. Conventions used in this document

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 <u>RFC 2119</u> [<u>RFC2119</u>].

5. Overview

The Infiniband Architecture[IBTAArch] is defined by the Infiniband Trade Association. Infiniband is designed to provide low latency high bandwidth interconnect in a computing environment. This document will define the objects related to the connection manager, managing the transports above layer 3 which are defined in the Infiniband MIB[IBIFMIB]

The Infiniband Architecture defines five transports above Infiniband: Raw, Unreliable Connected, Reliable Connected, Unreliable Datagram, and Reliable Datagram.

Raw packets are not normal usage and therefore will not be covered in this document. Infiniband goes so far as to specify hardware that has the ability to discard all Raw packets in hardware on reception.

The datagram tables can not be combined because the Unreliable Datagram service provides a simple listening service much like UDP, and the Reliable Connected service uses the concept of an End-End context to allow multiple Queue pairs behind the EEC to connect over a single reliability context saving resources on the Channel Adapter.

The connection tables are combined because the only differences

between the data is that a reliability layer is provided in hardware for the Reliable Connected service. This is handled by the single ibConnCReliable object.

- 5.1. Unreliable Datagram Table The unreliable datagram service in Infiniband is not required to go through the Connection Manager, and therefore no state is kept. For this reason the MIB will just track what Queue Pair Numbers the channel adapter is listening to.
- 5.2. Reliable Datagram Table

The reliable datagram service in Infiniband uses the Connection Management service to connect two endpoints through an End to End Context (EEC). This EEC can be used to connect multiple Queue Pairs, from multiple applications on each machine to the other side without having to maintain state on a separate EEC for each Queue pair.

Strahm	Internet Draft- Expires April 2002	4
	Infiniband Connection MIB	Oct 2001

5.3. Connection Table

The connection table is used to display connections between end applications. Each connection includes data indicating if the connection is reliable or unreliable, and what state the connection is in.

6. Next Steps

Currently the following questions need to be dealt with

- 1. What should be done with RAW IB packets û currently nothing
- 2. A compliance section needs to be added
- 3. What interface(s) might be used by an implementation to get this information from the Connection Manager
- 4. Where do the Unreliable Datagram values come from
- 5. A ibifMIB value needs to be allocated by the IpoverIB WG.
- 6. Use textual conventions where possible from the IB IF MIB document

Strahm	Internet Draft- Expires April 2002	5
	Infiniband Connection MIB	Oct 2001

7. Definitions

IBCONNECTION-MIB DEFINITIONS ::= BEGIN IMPORTS -- Do we use all of these ??? Counter32,

```
Counter64,
       Integer32,
       Gauge32,
       MODULE-IDENTITY,
       OBJECT-TYPE
             FROM SNMPv2-SMI
       TEXTUAL-CONVENTION,
       TruthValue
             FROM SNMPv2-TC
       OBJECT-GROUP,
       MODULE-COMPLIANCE
             FROM SNMPv2-CONF
       InterfaceIndex
             FROM IF-MIB
       IbIfMIB
             FROM IB-IF-MIB;
ibConnMIB MODULE-IDENTITY
    LAST-UPDATED "200110200000Z" -- 20 Oct 2001
   ORGANIZATION
     "IETF IP over IB Working Group"
   Email:
            "ipoverib@ietf.org"
   CONTACT-INFO
           "Bill Strahm
   Postal: Sanera Systems Inc.
            1925 NW Amberglen Parkway
           Suite 155
                           97006
            Beaverton, OR
           United States
   Tel: +1 503 601 0263
   Email: bill@sanera.net"
   DESCRIPTION
       "The managed objects for an Infiniband Channel Adapter. This
       MIB provides for management of the Infiniband transports in
       three tables:
       1) Unreliable Datagram
       2) Reliable Datagram
       3) Connected Services"
   REVISION
                "200110200000Z" -Û 20 Oct 2001
   DESCRIPTION "Initial version of this MIB."
::={ibIFMIB xxx} û- To be determined by the IPoIB WG
Strahm
               Internet Draft- Expires April 2002
                                                                  6
                   Infiniband Connection MIB
                                                          Oct 2001
```

- -

```
-- Textual Conventions
IBCommunicationID ::= TEXTUAL-CONVENTION
   STATUS
             current
   DESCRIPTION
       "The Communication ID for a given connection. Each end of a
       connection is responsible for picking a unique value for this
       field."
   SYNTAX
             Integer32
IBQuePairNumber ::= TEXTUAL-CONVENTION
   STATUS current
   DESCRIPTION
       "The Queue Pair Number of an IB communication endpoint.
       Queue Pairs are 24 bit numbers. To allow this value to be an
       index, one is added to the value that is sent on the wire"
   SYNTAX INTEGER (1..16777216)
IBEtoEContext ::= TEXTUAL-CONVENTION
   STATUS current
   DESCRIPTION
       "The End û End Context Number of an IB communiction endpoint.
      The EECN is a 24 bit number. To allow this value to be an
       index, one is added to the value that is sent on the wire"
   SYNTAX
             INTEGER (1..16777216)
-- Objects
ibConnMIBObjects OBJECT IDENTIFIER ::= { ibCAMIB 1 }
ibCAConformance OBJECT IDENTIFIER ::= { ibCAMIB 2 }
-- Unreliable Datagram
- -
ibConnUD OBJECT IDENTIFIER ::= { ibConnMibObjects 1 }
ibConnUDInDatagrams OBJECT-TYPE
SYNTAX
                   Counter64
MAX-ACCESS
                  read-only
STATUS
                   current
DESCRIPTION
   "Total number of Unreliable Datagrams delivered."
::= { ibConnUD 1 }
Strahm
              Internet Draft- Expires April 2002
                                                                 7
                  Infiniband Connection MIB
                                                         Oct 2001
```

OBJECT-TYPE

ibConnUDNoQP

```
Counter32
SYNTAX
MAX-ACCESS
                    read-only
STATUS
                    current
DESCRIPTION
   "Total number of received Unreliable Datagrams discarded because
   the QP wasnÆt allocated."
::= { ibConnUD 2 }
ibConnUDInErrors
                     OBJECT-TYPE
SYNTAX
                     Counter32
MAX-ACCESS
                     read-only
STATUS
                     current
DESCRIPTION
   "Number of received Unreliable Datagrams that could not be
   delivered for reasons other than the lack of an allocated QP."
::= { ibConnUD 3 }
ibConnUDOutDatagrams OBJECT-TYPE
SYNTAX
                     Counter64
MAX-ACCESS
                     read-only
STATUS
                     current
DESCRIPTION
   "Total number of Unreliable Datagrams sent from this entity."
::= { ibConnUD 4 }
ibConnUDTable OBJECT-TYPE
SYNTAX
              SEQUENCE OF IbConnUDEntry
MAX-ACCESS
              not-accessible
STATUS
              current
DESCRIPTION
   "A table containing information about all of the Unreliable
   Datagram Connections in the device."
::= { ibConnUD 5 }
ibConnUDEntry OBJECT-TYPE
SYNTAX
              IbConnUDEntry
MAX-ACCESS
              not-accessible
              current
STATUS
DESCRIPTION
   "A conceptual row of the containing information about a
   Unreliable connection entry."
INDEX { ibConnUDGID,
        ibConnUDLID,
        ibConnUDLocalQPN}
::= { ibConnUDTable 1 }
IbConnUDEntry ::= SEQUENCE {
        ibConnUDGID
                          GidTC,
        ibConnUDLID
                         LidTC,
        ibConnUDLocalQPN IBQuePairNumber
        }
```

```
Strahm
               Internet Draft- Expires April 2002
                                                                   8
                   Infiniband Connection MIB
                                                           Oct 2001
ibConnUDGID
                    OBJECT-TYPE
SYNTAX
                    GidTC
MAX-ACCESS
                    read-only
STATUS
                    current
DESCRIPTION
  "GID of listener."
::= { ibConnUDEntry 1 }
ibConnUDLID
                    OBJECT-TYPE
SYNTAX
                    LidTC
MAX-ACCESS
                    read-only
STATUS
                    current
DESCRIPTION
   "LID of listener."
::= { ibConnUDEntry 2 }
ibConnUDLocalQPN
                    OBJECT-TYPE
SYNTAX
                    IBQuePairNumber
MAX-ACCESS
                    read-only
STATUS
                     current
DESCRIPTION
   "Local Que Pair Number of listener."
::= { ibConnUDEntry 3 }
- -
-- Reliable Datagram
- -
ibConnRD OBJECT IDENTIFIER ::= { ibConnMibObjects 2 }
ibConnRDInDatagrams OBJECT-TYPE
SYNTAX
                    Counter64
MAX-ACCESS
                    read-only
STATUS
                    current
DESCRIPTION
   "Total number of Reliable Datagrams delivered."
::= { ibConnRD 1 }
ibConnRDNoQP
                     OBJECT-TYPE
SYNTAX
                    Counter32
MAX-ACCESS
                    read-only
STATUS
                    current
DESCRIPTION
   "Total number of received Reliable Datagrams discarded because
   the QP wasnÆt allocated."
```

```
Strahm
               Internet Draft- Expires April 2002
                                                                   9
                   Infiniband Connection MIB
                                                           Oct 2001
ibConnRDInErrors
                     OBJECT-TYPE
SYNTAX
                     Counter32
MAX-ACCESS
                     read-only
STATUS
                     current
DESCRIPTION
   "Number of received Reliable Datagrams that could not be
   delivered for reasons other than the lack of an allocated QP."
::= { ibConnRD 3 }
ibConnRDOutDatagrams OBJECT-TYPE
SYNTAX
                     Counter64
MAX-ACCESS
                     read-only
STATUS
                     current
DESCRIPTION
   "Total number of Reliable Datagrams sent from this entity."
::= { ibConnRD 4 }
ibConnRDTable OBJECT-TYPE
SYNTAX
            SEQUENCE OF IbConnRDEntry
MAX-ACCESS not-accessible
STATUS
            current
DESCRIPTION
   "A table containing information about all of the Reliable
   Datagram connections in the device."
::= { ibConnRD 5 }
ibConnRDEntry
                    OBJECT-TYPE
                     IbConnRDEntry
SYNTAX
MAX-ACCESS
                     not-accessible
STATUS
                     current
DESCRIPTION
   "A conceptual row of the containing information about a Reliable
   Datagram entry."
INDEX { ibConnRDLGID, ibConnRDLLID,
        ibConnRDLEEC, ibConnRDRGID,
        ibConnRDRLID, ibConnRDREEC }
::= { ibConnRDTable 1 }
IbConnRDEntry ::= SEQUENCE {
        ibConnRDLGID
                          GidTC,
        ibConnRDLLID
                          LidTC,
                         IBEtoEContext,
       ibConnRDLEEC
       ibConnRDRGID
                         GidTC,
```

::= { ibConnRD 2 }

LidTC, ibConnRDRLID ibConnRDREEC IBEtoEContext } Internet Draft- Expires April 2002 Strahm Infiniband Connection MIB Oct 2001 ibConnRDLGID OBJECT-TYPE SYNTAX GidTC MAX-ACCESS read-only STATUS current DESCRIPTION "GID of the local end of the connection." ::= { ibConnRDEntry 1 } ibConnRDLLID OBJECT-TYPE SYNTAX LidTC MAX-ACCESS read-only STATUS current DESCRIPTION "LID of the local end of the connection." ::= { ibConnRDEntry 2 } ibConnRDLEEC OBJECT-TYPE SYNTAX IBEtoEContext MAX-ACCESS read-only STATUS current DESCRIPTION "End to End Context of the local end of the connection." ::= { ibConnRDEntry 3 } ibConnRDRGID OBJECT-TYPE SYNTAX GidTC MAX-ACCESS read-only STATUS current DESCRIPTION "GID of the remote end of the connection." ::= { ibConnRDEntry 4 } ibConnRDRLID OBJECT-TYPE LidTC SYNTAX MAX-ACCESS read-only STATUS current DESCRIPTION "LID of the remote end of the connection." ::= { ibConnRDEntry 5 } ibConnRDREEC OBJECT-TYPE SYNTAX IBEtoEContext

10

```
MAX-ACCESS read-only
STATUS
            current
DESCRIPTION
  "End to End Context of the remote end of the connection."
::= { ibConnRDEntry 6 }
Strahm
               Internet Draft- Expires April 2002
                                                                 11
                   Infiniband Connection MIB
                                                          Oct 2001
- -
-- Connected
- -
ibConnConnected OBJECT IDENTIFIER ::= { ibConnMibObjects 3 }
ibConnCInSegs OBJECT-TYPE
SYNTAX
          Counter64
MAX-ACCESS read-only
STATUS
            current
DESCRIPTION
  "The total number of segments received, including those
    received in error. This count includes segments received on
    currently established connections."
::= { ibConnConnected 1 }
ibConnCOutSegs OBJECT-TYPE
SYNTAX
            Counter64
MAX-ACCESS read-only
STATUS
            current
DESCRIPTION
   "The total number of segments sent, including those on
  current connections but excluding those containing only
  retransmitted octets."
::= { ibConnConnected 2 }
ibConnCTable OBJECT-TYPE
SYNTAX
            SEQUENCE OF IbConnCEntry
MAX-ACCESS not-accessible
STATUS
            current
DESCRIPTION
   "A table containing information about all of the Connections in
  the device. This table contains connections that are both
  reliable and unreliable."
::= { ibConnConnected 3 }
ibConnCEntry OBJECT-TYPE
SYNTAX
           IbConnCEntry
MAX-ACCESS not-accessible
STATUS
          current
```

```
DESCRIPTION
   "A conceptual row of the containing information about a
  Connection entry."
INDEX { ibConnCLGID, ibConnCLLID, ibConnCLQPN,
        ibConnCRGID, ibConnCRLID, ibConnCRQPN }
::= { ibConnCTable 1 }
Strahm
              Internet Draft- Expires April 2002
                                                                12
                   Infiniband Connection MIB
                                                         Oct 2001
IbConnCEntry ::= SEQUENCE {
       ibConnCLGID
                         GidTC,
       ibConnCLLID
                        LidTC,
       ibConnCLQPN
                        IBQuePairNumber,
       ibConnCRGID
                        GidTC,
       ibConnCRLID
                        LidTC,
       ibConnCRQPN
                         IBQuePairNumber,
       ibConnCState
                        INTEGER,
        ibConnCReliable TruthValue
       }
ibConnCLGID OBJECT-TYPE
SYNTAX
        GidTC
MAX-ACCESS read-only
           current
STATUS
DESCRIPTION
   "GID of the local end of the connection."
::= { ibConnCEntry 1 }
ibConnCLLID OBJECT-TYPE
        LidTC
SYNTAX
MAX-ACCESS read-only
STATUS
           current
DESCRIPTION
  "LID of the local end of the connection."
::= { ibConnCEntry 2 }
ibConnCLQPN OBJECT-TYPE
SYNTAX
        IBQuePairNumber
MAX-ACCESS read-only
STATUS
           current
DESCRIPTION
  "Que Pair Number of the local end of the connection."
::= { ibConnCEntry 3 }
ibConnCRGID OBJECT-TYPE
SYNTAX
       GidTC
MAX-ACCESS read-only
STATUS current
```

```
DESCRIPTION
   "GID of the remote end of the connection."
::= { ibConnCEntry 4 }
ibConnCRLID OBJECT-TYPE
SYNTAX
           LidTC
MAX-ACCESS read-only
STATUS
            current
DESCRIPTION
   "LID of the remote end of the connection."
::= { ibConnCEntry 5 }
Strahm
               Internet Draft- Expires April 2002
                                                                  13
                   Infiniband Connection MIB
                                                           Oct 2001
ibConnCROPN OBJECT-TYPE
SYNTAX
            IBEtoEContext
MAX-ACCESS read-only
STATUS
            current
DESCRIPTION
  "Que Pair Number of the remote end of the connection."
::= { ibConnCEntry 6 }
ibConnCState OBJECT-TYPE
SYNTAX
             INTEGER {
                 listen (1),
                 reqSent (2),
                 reqRcvd (3)
                 repRcvd (4),
                 Established (5),
                 dreqSent (6),
                 dreqRcvd (7),
                 timeWait (8),
                 rtuTimeout (9),
                 peerCompare (10),
                 timeout (11),
                 repWait (12),
                 mraREPSent (13),
                 drepTimeout (14)
                 }
             read-only
MAX-ACCESS
STATUS
             current
DESCRIPTION
   "State of the connection. Derived from 12.9.5 and 12.9.6."
::= { ibConnCEntry 7 }
ibConnCReliable
                    OBJECT-TYPE
SYNTAX
                    TruthValue
```

```
MAX-ACCESS read-only
STATUS current
DESCRIPTION
    "Reliability of the connection."
    ::= { ibConnCEntry 8 }
--
    Module Groups
--
    ibCAGroups OBJECT IDENTIFIER ::= { ibCAConformance 1}
    ibCAUnreliableDatagram OBJECT IDENTIFIER ::= { ibCAGroups 1 }
    ibCAReliableDatagram OBJECT IDENTIFIER ::= { ibCAGroups 2 }
    ibCAUnreliableConnected OBJECT IDENTIFIER ::= { ibCAGroups 3 }
    ibCAReliableConnected OBJECT IDENTIFIER ::= { ibCAGroups 4 }
```

END

```
StrahmInternet Draft- Expires April 200214Infiniband Connection MIBOct 2001
```

8. Security Considerations

There are no management objects defined in this MIB that have a MAX-ACCESS clause of read-write and/or read-create. So, if this MIB is implemented correctly, then there is no risk that an intruder can alter or create any management objects of this MIB via direct SNMP SET operations.

There are a number of managed objects in this MIB that may contain sensitive information. It is thus important to control even GET access to these objects and possibly to even encrypt the values of these objects when sending them over the network via SNMP. Not all versions of SNMP provide features for such a secure environment.

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 <u>RFC 2574</u> [<u>RFC2574</u>] and the View-based Access Control Model <u>RFC 2575</u> [<u>RFC2575</u>] are 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.

9. Intellectual Property

The IETF takes no position regarding the validity or scope of any intellectual property or other rights that might be claimed to pertain to the implementation or use of the technology described this document or the extent to which any license under such in might or might not be available; neither does it rights has made any effort to identify any such represent that it rights. Information on the IETF's procedures with respect to rights in standards-track and standards-related documentation can be found in <u>BCP-11</u>. Copies of claims of rights made available for publication and any assurances of licenses to be made available, or the result of an attempt made to obtain a general license or permission for the use of such proprietary rights by implementers or users of this specification can be obtained from the IETF Secretariat.

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Strahm	Internet Draft- Expires April 2002	15
	Infiniband Connection MIB	Oct 2001

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Strahm	Internet Draft- Expires April 2002	16
	Infiniband Connection MIB	Oct 2001

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- StrahmInternet Draft- Expires April 200217Infiniband Connection MIBOct 2001
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Strahm Internet Draft- Expires April 2002

18