

June 2004

Bidirectional Forwarding Detection Management Information Base

[draft-ietf-bfd-mib-00.txt](#)

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Abstract

This draft defines a portion of the Management Information Base (MIB) for use with network management protocols in the Internet community. In particular, it describes managed objects for modeling Bidirectional Forwarding Detection (BFD) protocol [[BFD](#)].

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[1](#). Introduction

For a detailed overview of the documents that describe the current Internet-Standard Management Framework, please refer to section 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](#)].

Current work is underway in the IETF to specify a suite of protocols known as Bidirectional Forwarding Detection to detect faults in the bidirectional path between two forwarding engines, including interfaces, data link(s), and to the extent possible the forwarding engines themselves, with potentially very low latency [[BFD](#)].

In this document we describe a MIB module that can be used to manage BFD implementations. This MIB module covers both configuration and performance monitoring aspects of BFD.

This document is based on [draft-katz-ward-bfd-02.txt](#) [[BFD](#)] and only addresses MIB for MFD running over point-to-point interfaces. Specifically, this version of the ID does not address BFD over shared interfaces [[BFD SHARED](#)]. Furthermore, at present we do not directly address manageability requirement when LSP-Ping is used for boot-strapping the BFD session [[BFD-LSP](#)]. Nonetheless, some considerations are in place for these applications of the BFD. These aspects of BFD will be directly addressed in the future version of

the ID.

2. Terminology

This document uses terminology from the document describing the BFD protocol [[BFD](#)].

3. The SNMP 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](#)].

4. Use of 32-bit and 64-bit Counters

64-bit counters are provided in this MIB module for high speed interfaces where the use of 32-bit counters might be impractical. The requirements on the use of 32-bit and 64-bit counters (copied verbatim from [[RFC2863](#)]) are as follows.

For interfaces that operate at 20,000,000 (20 million) bits per second or less, 32-bit byte and packet counters MUST be supported. For interfaces that operate faster than 20,000,000 bits/second, and slower than 650,000,000 bits/second, 32-bit packet counters MUST be supported and 64-bit octet counters MUST be supported. For interfaces that operate at 650,000,000 bits/second or faster, 64-bit packet counters AND 64-bit octet counters MUST be supported.

5. Brief Description of MIB Objects

This section describes objects pertaining to BFD. The MIB objects are derived from the BFD document [[BFD](#)].

5.1 General Variables

The General Variables are used to identify parameters that are global to the BFD process.

5.2 Session Table (bfdSessionTable)

The session table is used to identify a BFD session between a

pair of nodes.

5.3 Session Performance Table (bfdSessionPerfTable)

The session performance table is used for collecting BFD performance counts on a per session basis. This table is an AUGMENT to the bfdSessionTable.

5.4 Session Mapping Table (bfdSessMapTable)

The BFD Session Mapping Table maps the complex indexing of the BFD sessions to the flat BFDIndex used in the BfdSessionTable.

6. BFD MIB Module Definitions

```
BFD-DRAFT-00-MIB DEFINITIONS ::= BEGIN
```

```
IMPORTS
```

```
    MODULE-IDENTITY, OBJECT-TYPE,  
    Unsigned32, Counter32, Counter64,  
    NOTIFICATION-TYPE, mib-2  
    FROM SNMPv2-SMI
```

```
    MODULE-COMPLIANCE, OBJECT-GROUP, NOTIFICATION-GROUP  
    FROM SNMPv2-CONF
```

```
    TEXTUAL-CONVENTION, TruthValue, RowStatus, StorageType,  
    TimeStamp  
    FROM SNMPv2-TC
```

```
    InetAddress, InetAddressType  
    FROM INET-ADDRESS-MIB
```

```
;
```

```
bfdMIB MODULE-IDENTITY
```

```
    LAST-UPDATED "200401221200Z" -- 22 January 2004 12:00:00 EST
```

```
    ORGANIZATION "IETF"
```

```
    CONTACT-INFO
```

```
        "          Zafar Ali  
          Cisco Systems, Inc.  
        Email:    zali@cisco.com
```

```
          Thomas D. Nadeau  
          Cisco Systems, Inc.  
        Email:    tnadeau@cisco.com  
        "
```

```
DESCRIPTION
```

```
    "Bidirectional Forwarding Management Information Base."
```

-- Revision history.

REVISION

"200401221200Z" -- 22 January 2004 12:00:00 EST

DESCRIPTION

"Initial version."

::= { mib-2 999 } -- To be assigned by IANA.

-- Top level components of this MIB module.

bfdNotifications OBJECT IDENTIFIER ::= { bfdMIB 0 }

bfdObjects OBJECT IDENTIFIER ::= { bfdMIB 1 }

bfdConformance OBJECT IDENTIFIER ::= { bfdMIB 3 }

bfdScalarObjects OBJECT IDENTIFIER ::= { bfdObjects 1 }

-- Textual Conventions

BfdSessIndexTC ::= TEXTUAL-CONVENTION

DISPLAY-HINT "d"

STATUS current

DESCRIPTION

"An index used to uniquely identify BFD sessions."

SYNTAX Unsigned32 (1..4294967295)

BfdInterval ::= TEXTUAL-CONVENTION

DISPLAY-HINT "d"

STATUS current

DESCRIPTION

"The BFD interval delay in microseconds."

SYNTAX Unsigned32 (1..4294967295)

BfdDiag ::= TEXTUAL-CONVENTION

STATUS current

DESCRIPTION

"A common BFD diagnostic code."

SYNTAX INTEGER { noDiagnostic(1),
controlDetectionTimeExpired(2),
echoFunctionFailed(3),
neighborSignaledSessionDown(4),
forwardingPlaneReset(5),
pathDown(6),
concatenatedPathDown(7),

```
        administrativelyDown(8)  
    }
```

-- BFD General Variables

-- These parameters apply globally to the Router's
-- BFD Process.

bfdAdminStatus OBJECT-TYPE

SYNTAX INTEGER { enabled(1), disabled(2) }

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"The global administrative status of BFD in this router.
The value 'enabled' denotes that the BFD Process is active
on at least one interface; 'disabled' disables it on
all interfaces."

DEFVAL { enabled }

::= { bfdScalarObjects 1 }

bfdOperStatus OBJECT-TYPE

SYNTAX INTEGER { up(1), down(2) }

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The operational status of BFD on this router."

::= { bfdScalarObjects 2 }

bfdVersionNumber OBJECT-TYPE

SYNTAX Unsigned32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The current version number of the BFD protocol."

REFERENCE

" BFD Version 0 ([draft-katz-ward-bfd-04.txt](#))"

DEFVAL { 0 }

::= { bfdScalarObjects 3 }

-- BFD Session Table

-- The BFD Session Table specifies BFD session specific
-- information.

bfdSessTable OBJECT-TYPE

SYNTAX SEQUENCE OF BfdSessEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"The BFD Session Table describes the BFD sessions."

REFERENCE

"BFD Version 0 ([draft-katz-ward-bfd-04.txt](#))"

```
::= { bfdObjects 2 }
```

```
bfdSessEntry OBJECT-TYPE
```

```
SYNTAX BfdSessEntry
```

```
MAX-ACCESS not-accessible
```

```
STATUS current
```

```
DESCRIPTION
```

```
"The BFD Session Entry describes BFD session."
```

```
INDEX { bfdSessIndex }
```

```
::= { bfdSessTable 1 }
```

```
BfdSessEntry ::= SEQUENCE {
```

bfdSessIndex	BfdSessIndexTC,
bfdSessApplicationId	Unsigned32,
bfdSessDiscriminator	Unsigned32,
bfdSessLocalDiscr	Unsigned32,
bfdSessRemoteDiscr	Unsigned32,
bfdSessState	INTEGER,
bfdSessRemoteHeardFlag	TruthValue,
bfdSessDiag	Unsigned32,
bfdSessOperMode	INTEGER,
bfdSessDemandModeDesiredFlag	TruthValue,
bfdSessEchoFuncModeDesiredFlag	TruthValue,
bfdSessEchoFuncFlag	INTEGER,
bfdSessAddrType	InetAddressType,
bfdSessAddr	InetAddress,
bfdSessDesiredMinTxInterval	BfdInterval,
bfdSessDesiredMinRxInterval	BfdInterval,
bfdSessDesiredMinEchoRxInterval	BfdInterval,
bfdSessDetectMult	BfdInterval,
bfdSessStorType	StorageType,
bfdSessRowStatus	RowStatus

```
}
```

```
bfdSessIndex OBJECT-TYPE
```

```
SYNTAX BfdSessIndexTC
```

```
MAX-ACCESS not-accessible
```

```
STATUS current
```

```
DESCRIPTION
```

```
"This object contains an index used to represent a  
unique BFD session on this device."
```

```
::= { bfdSessEntry 1 }
```

```
bfdSessApplicationId OBJECT-TYPE
```

```
SYNTAX Unsigned32
```

```
MAX-ACCESS read-only
```

```
STATUS current
```

DESCRIPTION

"This object contains an index used to indicate
an local application which owns or maintains this

BFD session. For instance, the VPN process may maintain a subset of the total number of BFD sessions. This application ID provides a convenient way to segregate sessions by the applications which maintain them."

::= { bfdSessEntry 2 }

bfdSessDiscriminator OBJECT-TYPE

SYNTAX Unsigned32 (1..4294967295)

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"This object specifies the local discriminator for this BFD session, used to uniquely identify it."

::= { bfdSessEntry 3 }

bfdSessLocalDiscr OBJECT-TYPE

SYNTAX Unsigned32 (1..4294967295)

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"This object specifies the local discriminator for this BFD session, used to uniquely identify it."

::= { bfdSessEntry 4 }

bfdSessRemoteDiscr OBJECT-TYPE

SYNTAX Unsigned32 (1..4294967295)

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"This object specifies the discriminator chosen by the remote system local discriminator for this BFD session."

::= { bfdSessEntry 5 }

bfdSessState OBJECT-TYPE

SYNTAX INTEGER {

init(1),

up(2),

failing(3),

down(4),

adminDown(5)

}

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The perceived state of the BFD session."

```
::= { bfdSessEntry 6 }
```

bfdSessRemoteHeardFlag OBJECT-TYPE

SYNTAX TruthValue

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"This object specifies status of BFD packet reception from the remote system. Specifically, it is set to true(1) if the local system is actively receiving BFD packets from the remote system, and is set to false(0) if the local system has not received BFD packets recently (within the detection time) or if the local system is attempting to tear down the BFD session."

::= { bfdSessEntry 7 }

bfdSessDiag OBJECT-TYPE

SYNTAX Unsigned32

MAX-ACCESS accessible-for-notify

STATUS current

DESCRIPTION

"A diagnostic code specifying the local system's reason for the last transition of the session from up(1) to some other state."

::= { bfdSessEntry 8 }

bfdSessOperMode OBJECT-TYPE

SYNTAX INTEGER { asyncModeWEchoFun(1),
asynchModeW0EchoFun(2),
demandModeWEchoFunction(3),
demandModeW0EchoFunction(4)
}

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"This object specifies current operating mode that BFD session is operating in.

A value of AsyncModeWEchoFun(1) ...

A value of AsynchModeW0EchoFun(2) ...

A value of DemandModeWEchoFunction(3) ...

A value of DemandModeW0EchoFunction(4) ...

"

::= { bfdSessEntry 9 }

bfdSessDemandModeDesiredFlag OBJECT-TYPE

SYNTAX TruthValue

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"This object indicates that the local system's desire to use Demand mode. Specifically, it is set to true(1) if the local system wishes to use

Demand mode or false(0) if not"
DEFVAL { false }
::= { bfdSessEntry 10 }

bfdSessEchoFuncModeDesiredFlag OBJECT-TYPE

SYNTAX TruthValue
MAX-ACCESS read-create
STATUS current
DESCRIPTION
 "This object indicates that the local system's
 desire to use Echo mode. Specifically, it is set
 to true(1) if the local system wishes to use
 Echo mode or false(0) if not"
DEFVAL { false }
::= { bfdSessEntry 11 }

bfdSessEchoFuncFlag OBJECT-TYPE

SYNTAX INTEGER { enabled(1), disabled(2) }
MAX-ACCESS read-create
STATUS current
DESCRIPTION
 "The administrative status of Echo function for this BFD
 session. The value 'enabled' denotes that the Echo
 function is enabled for this session; 'disabled' disables
 Echo function for this session."
::= { bfdSessEntry 12 }

bfdSessAddrType OBJECT-TYPE

SYNTAX InetAddressType
MAX-ACCESS read-create
STATUS current
DESCRIPTION
 "This object specifies IP address of the interface associated with
 this BFD session.

 Only values unknown(0), ipv4(1) or ipv6(2)
 have to be supported.

 A value of unknown(0) is allowed only when
 the outgoing interface is of type point-to-point, or
 when the BFD session is not associated with a specific
 interface.

 If any other unsupported values are attempted in a set
 operation, the agent MUST return an inconsistentValue
 error.

"

```
::= { bfdSessEntry 13 }
```

bfdSessAddr OBJECT-TYPE

SYNTAX InetAddress

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"This object specifies IP address of the interface associated with this BFD session. It can also be used to enabled BFD on a specific interface. The value is set to zero when BFD session is not associated with a specific interface. "

::= { bfdSessEntry 14 }

bfdSessDesiredMinTxInterval OBJECT-TYPE

SYNTAX BfdInterval

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"This object specifies the minimum interval, in microseconds, that the local system would like to use when transmitting BFD Control packets."

::= { bfdSessEntry 15 }

bfdSessDesiredMinRxInterval OBJECT-TYPE

SYNTAX BfdInterval

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"This object specifies the minimum interval, in microseconds, between received BFD Control packets the local system is capable of supporting."

::= { bfdSessEntry 16 }

bfdSessDesiredMinEchoRxInterval OBJECT-TYPE

SYNTAX BfdInterval

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"This object specifies the minimum interval, in microseconds, between received BFD Echo packets that this system is capable of supporting."

::= { bfdSessEntry 17 }

bfdSessDetectMult OBJECT-TYPE

SYNTAX BfdInterval

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"This object specifies the Detect time multiplier."

::= { bfdSessEntry 18 }

bfdSessStorType	OBJECT-TYPE
SYNTAX	StorageType

MAX-ACCESS read-create
STATUS current
DESCRIPTION
 "This variable indicates the storage type for this
 object. Conceptual rows having the value
 'permanent' need not allow write-access to any
 columnar objects in the row."
::= { bfdSessEntry 19 }

bfdSessRowStatus OBJECT-TYPE
SYNTAX RowStatus
MAX-ACCESS read-create
STATUS current
DESCRIPTION
 "This variable is used to create, modify, and/or
 delete a row in this table. When a row in this
 table has a row in the active(1) state, no
 objects in this row can be modified except the
 bfdSessRowStatus and bfdSessStorageType."
::= { bfdSessEntry 20 }

-- BFD Session Performance Table

bfdSessPerfTable OBJECT-TYPE
SYNTAX SEQUENCE OF BfdSessPerfEntry
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
 "This table specifies BFD Session performance counters."
::= { bfdObjects 3 }

bfdSessPerfEntry OBJECT-TYPE
SYNTAX BfdSessPerfEntry
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
 "An entry in this table is created by a BFD-enabled node for
 every BFD Session. bfdCounterDiscontinuityTime is used to
 indicate potential discontinuity for all counter objects
 in this table."
AUGMENTS { bfdSessEntry }
::= { bfdSessPerfTable 1 }

BfdSessPerfEntry ::= SEQUENCE {
 bfdSessPerfPktIn Counter32,
 bfdSessPerfPktOut Counter32,

bfdSessPerfBadDiscrim	Counter32,
bfdSessPerfLastSessDownTime	TimeStamp,
bfdSessPerfLastCommLostDiag	BfdDiag,

```
bfdSessPerfSessDownCount      Counter32,  
bfdSessPerfDiscTime          TimeStamp,
```

```
-- High Capacity Counters
```

```
bfdSessPerfPktInHC            Counter64,  
bfdSessPerfPktOutHC           Counter64,  
bfdSessPerfBadDiscrimHC       Counter64
```

```
}
```

```
-- Ed Note: should we add per-diag code counts here,
```

```
bfdSessPerfPktIn OBJECT-TYPE
```

```
SYNTAX      Counter32
```

```
MAX-ACCESS  read-only
```

```
STATUS      current
```

```
DESCRIPTION
```

```
    "The total number of BFD messages received for this BFD session."
```

```
::= { bfdSessPerfEntry 1 }
```

```
bfdSessPerfPktOut OBJECT-TYPE
```

```
SYNTAX      Counter32
```

```
MAX-ACCESS  read-only
```

```
STATUS      current
```

```
DESCRIPTION
```

```
    "The total number of BFD messages sent for this BFD session."
```

```
::= { bfdSessPerfEntry 2 }
```

```
bfdSessPerfBadDiscrim OBJECT-TYPE
```

```
SYNTAX      Counter32
```

```
MAX-ACCESS  read-only
```

```
STATUS      current
```

```
DESCRIPTION
```

```
    "The total number of BFD messages received with a  
    bad local Discriminator value for this BFD session."
```

```
::= { bfdSessPerfEntry 3 }
```

```
bfdSessPerfLastSessDownTime OBJECT-TYPE
```

```
SYNTAX      TimeStamp
```

```
MAX-ACCESS  read-only
```

```
STATUS      current
```

```
DESCRIPTION
```

```
    "The value of sysUpTime on the most recent occasion at which  
    the last time communication was lost with the neighbor. If  
    no such down event exist this object contains a zero value."
```

```
::= { bfdSessPerfEntry 4 }
```

```
bfdSessPerfLastCommLostDiag OBJECT-TYPE
```

SYNTAX	BfdDiag
MAX-ACCESS	read-only

STATUS current

DESCRIPTION

"The BFD diag code for the last time communication was lost with the neighbor. If no such down event exist this object contains a zero value."

::= { bfdSessPerfEntry 5 }

bfdSessPerfSessDownCount OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The number of times this session has gone into the down state since the router last rebooted."

::= { bfdSessPerfEntry 6 }

bfdSessPerfDiscTime 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 session counters suffered a discontinuity. The relevant counters are the specific instances associated with this BFD session of any Counter32 object contained in the BfdSessPerfTable. If no such discontinuities have occurred since the last re-initialization of the local management subsystem, then this object contains a zero value."

::= { bfdSessPerfEntry 7 }

bfdSessPerfPktInHC OBJECT-TYPE

SYNTAX Counter64

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"This value represents the total number of total number of BFD messages received for this BFD session. It MUST be equal to the least significant 32 bits of bfdSessPerfPktIn if bfdSessPerfPktInHC is supported according to the rules spelled out in [RFC2863](#)."

::= { bfdSessPerfEntry 8 }

bfdSessPerfPktOutHC OBJECT-TYPE

SYNTAX Counter64

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"This value represents the total number of
total number of BFD messages transmitted for this

BFD session. It MUST be equal to the least significant 32 bits of bfdSessPerfPktIn if bfdSessPerfPktOutHC is supported according to the rules spelled out in [RFC2863](#)."

::= { bfdSessPerfEntry 9 }

bfdSessPerfBadDiscrimHC OBJECT-TYPE

SYNTAX Counter64

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"This value represents the total number of total number of BFD messages received with a bad local Discriminator value for this BFD session. It MUST be equal to the least significant 32 bits of bfdSessPerfBadDiscrimHC if bfdSessPerfBadDiscrimHC is supported according to the rules spelled out in [RFC2863](#)."

::= { bfdSessPerfEntry 10 }

-- BFD Sess Mapping Table

bfdSessMapTable OBJECT-TYPE

SYNTAX SEQUENCE OF BfdSessMapEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"The BFD Session Map Table maps the complex indexing of the BFD sessions to the flat BfdIndex used in the BfdSessionTable.

Implementors need to be aware that if the value of the bfdSessAddr (an OID) has more than 111 sub-identifiers, then OIDs of column instances in this table will have more than 128 sub-identifiers and cannot be accessed using SNMPv1, SNMPv2c, or SNMPv3.

"

REFERENCE

"BFD Version 0 ([draft-katz-ward-bfd-04.txt](#))"

::= { bfdObjects 4 }

bfdSessMapEntry OBJECT-TYPE

SYNTAX BfdSessMapEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"The BFD Session Entry describes BFD session
that is mapped to this index.

Implementors need to be aware that if the value of the bfdSessAddr has more than 111 octets, then OIDs of column instances in this table will have more than 128 sub-identifiers and cannot be accessed using SNMPv1, SNMPv2c, or SNMPv3"

```
INDEX { bfdSessApplicationId,
        bfdSessDiscriminator,
        bfdSessAddrType,
        bfdSessAddr
}
 ::= { bfdSessMapTable 1 }
```

```
BfdSessMapEntry ::= SEQUENCE {
    bfdSessMapBfdIndex          BfdSessIndexTC
}
```

bfdSessMapBfdIndex OBJECT-TYPE

SYNTAX BfdSessIndexTC

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"This object specifies the BfdIndex referred to by the indexes of this row. In essence, a mapping is provided between these indexes and the BfdSessTable."

```
 ::= { bfdSessMapEntry 1 }
```

-- Notification Configuration

bfdSessNotificationsEnable OBJECT-TYPE

SYNTAX TruthValue

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"If this object is set to true(1), then it enables the emission of bfdSessUp and bfdSessDown notifications; otherwise these notifications are not emitted."

REFERENCE

"See also [RFC3413](#) for explanation that notifications are under the ultimate control of the MIB modules in this document."

DEFVAL { false }

```
 ::= { bfdScalarObjects 4 }
```

bfdSessUp NOTIFICATION-TYPE

OBJECTS { bfdSessDiag, -- low range value

```
        bfdSessDiag  -- high range value
    }
```

STATUS current

DESCRIPTION

"This notification is generated when the bfdSessState object for one or more contiguous entries in bfdSessTable are about to enter the up(2) state from some other state. The included values of bfdSessDiag MUST both be set equal to this new state (i.e: up(1)). The two instances of bfdSessDiag in this notification indicate the range of indexes that are affected. Note that all the indexes of the two ends of the range can be derived from the instance identifiers of these two objects. For cases where a contiguous range of sessions have transitioned into the up(1) state at roughly the same time, the device SHOULD issue a single notification for each range of contiguous indexes in an effort to minimize the emission of a large number of notifications. If a notification has to be issued for just a single bfdSessEntry, then the instance identifier (and values) of the two bfdSessDiag objects MUST be the identical."

::= { bfdNotifications 1 }

bfdSessDown NOTIFICATION-TYPE

OBJECTS { bfdSessDiag, -- low range value
 bfdSessDiag -- high range value

}

STATUS current

DESCRIPTION

"This notification is generated when the bfdSessState object for one or more contiguous entries in bfdSessTable are about to enter the down(4) or adminDown(5) states from some other state. The included values of bfdSessDiag MUST both be set equal to this new state (i.e: down(4) or adminDown(5)). The two instances of bfdSessDiag in this notification indicate the range of indexes that are affected. Note that all the indexes of the two ends of the range can be derived from the instance identifiers of these two objects. For cases where a contiguous range of sessions have transitioned into the down(4) or adminDown(5) states at roughly the same time, the device SHOULD issue a single notification for each range of contiguous indexes in an effort to minimize the emission of a large number of notifications. If a notification has to be issued for just a single bfdSessEntry, then the instance identifier (and values) of the two

```
        bfdSessDiag objects MUST be the identical."  
 ::= { bfdNotifications 2 }
```

-- Module compliance.

bfdGroups

OBJECT IDENTIFIER ::= { bfdConformance 1 }

bfdCompliances

OBJECT IDENTIFIER ::= { bfdConformance 2 }

-- Compliance requirement for fully compliant implementations.

bfdModuleFullCompliance MODULE-COMPLIANCE

STATUS current

DESCRIPTION "Compliance statement for agents that provide full support for BFD-MIB. Such devices can then be monitored and also be configured using this MIB module."

MODULE -- This module.

MANDATORY-GROUPS {
 bfdSessionGroup,
 bfdSessionPerfGroup,
 bfdSessionPerfHCGroup,
 bfdNotificationGroup
}

GROUP bfdSessionPerfHCGroup

DESCRIPTION "This group is mandatory for those bfdPerfTable entries for which any of the objects bfdSessPerfPktInHC, bfdSessPerfPktOutHC, or bfdSessPerfBadDiscrimHC wraps around too quickly based on the criteria specified in [RFC 2863](#) for high-capacity counters."

GROUP bfdNotificationGroup

DESCRIPTION "This group is only mandatory for those implementations which can efficiently implement the notifications contained in this group."

OBJECT bfdSessAddrType

SYNTAX InetAddressType { unknown(0), ipv4(1), ipv6(2) }

DESCRIPTION "Only unknown(0), ipv4(1) and ipv6(2) support is required."

OBJECT bfdSessAddr

SYNTAX InetAddress (SIZE(0|4|16))

DESCRIPTION "An implementation is only required to support unknown(0), ipv4(1) and ipv6(2) sizes."

::= { bfdCompliances 1 }

-- Read-Only compliance TBD...

-- Units of conformance.

bfdSessionGroup OBJECT-GROUP

OBJECTS {

 bfdSessNotificationsEnable,
 bfdAdminStatus,
 bfdOperStatus,
 bfdVersionNumber,
 bfdSessApplicationId,
 bfdSessDiscriminator,
 bfdSessAddrType,
 bfdSessAddr,
 bfdSessLocalDiscr,
 bfdSessRemoteDiscr,
 bfdSessState,
 bfdSessRemoteHeardFlag,
 bfdSessDiag,
 bfdSessOperMode,
 bfdSessDemandModeDesiredFlag,
 bfdSessEchoFuncFlag,
 bfdSessEchoFuncModeDesiredFlag,
 bfdSessDesiredMinTxInterval,
 bfdSessDesiredMinRxInterval,
 bfdSessDesiredMinEchoRxInterval,
 bfdSessDetectMult,
 bfdSessStorType,
 bfdSessRowStatus,
 bfdSessMapBfdIndex

}

STATUS current

DESCRIPTION

 "Collection of objects needed for BFD sessions."

::= { bfdGroups 1 }

bfdSessionPerfGroup OBJECT-GROUP

OBJECTS {

 bfdSessPerfPktIn,
 bfdSessPerfPktOut,
 bfdSessPerfBadDiscrim,
 bfdSessPerfLastSessDownTime,
 bfdSessPerfLastCommLostDiag,
 bfdSessPerfSessDownCount,
 bfdSessPerfDiscTime

}

STATUS current

DESCRIPTION

"Collection of objects needed to monitor the

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```
        performance of BFD sessions."
 ::= { bfdGroups 2 }
```

bfdSessionPerfHCGroup OBJECT-GROUP

```
OBJECTS {
    bfdSessPerfPktInHC,
    bfdSessPerfPktOutHC,
    bfdSessPerfBadDiscrimHC
}
STATUS current
DESCRIPTION
    "Collection of objects needed to monitor the
    performance of BFD sessions for which the
    values of bfdSessPerfPktIn,
    bfdSessPerfPktOut, or bfdSessPerfBadDiscrim
    wrap around too quickly."
 ::= { bfdGroups 3 }
```

bfdNotificationGroup NOTIFICATION-GROUP

```
NOTIFICATIONS {
    bfdSessUp,
    bfdSessDown
}
STATUS current
DESCRIPTION
    "Set of notifications implemented in this
    module."
 ::= { bfdGroups 4 }
```

END

7. 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. 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.

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.

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 these MIB modules.

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.

[8. Acknowledgements](#)

We would like to thank David Ward for his comments and suggestions.

[9. References](#)

[9.1 Normative References](#)

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