

June 2004

Bidirectional Forwarding Detection Management
Information Base

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

Status of this Memo

This document is an Internet-Draft and is in full conformance with all provisions of [Section 10 of RFC 2026](#).

Internet-Drafts are working documents of the Internet Engineering Task Force (IETF), its areas, and its working groups. Note that other groups may also distribute working documents as Internet-Drafts.

Internet-Drafts are draft documents valid for a maximum of six months and may be updated, replaced, or obsoleted by other documents at any time. It is inappropriate to use Internet-Drafts as reference material or to cite them other than as "work in progress."

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

The list of Internet-Draft Shadow Directories can be accessed at <http://www.ietf.org/shadow.html>.

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](#)].

Table of Contents

1.	Introduction	2
2.	Terminology	2
3.	The SNMP Management Framework	3

4. Use of 32-bit and 64-bit Counters	3
5. Brief Description of MIB Objects	3
5.1 General Variables	3
5.2 Session Table (bfdSessionTable)	4

5.3 Session Performance Table (bfdSessionPerfTable)	4
5.4 Session Mapping Table (bfdSessMapTable)	4
6. BFD MIB Module Definitions	4
7. Security Considerations	20
8. Acknowledgements	21
9. References	21
9.1. Normative References	21
9.2. Informative References	22
10. Author's Addresses	22
11. Full Copyright Statement	22
12. Intellectual Property Notice	22
13. IANA Considerations	23

[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 [BFDSHARED]. 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

BFD Working Group Expires December 2004 [Page 2]

Internet Draft BFD-DRAFT-00-MIB June 2004

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

BFD Working Group	Expires December 2004	[Page 3]
-------------------	-----------------------	----------

Internet Draft	BFD-DRAFT-00-MIB	June 2004
----------------	------------------	-----------

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](#))"

BFD Working Group

Expires December 2004

[Page 6]

Internet Draft

BFD-DRAFT-00-MIB

June 2004

::= { 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

BFD Working Group Expires December 2004 [Page 8]

Internet Draft BFD-DRAFT-00-MIB June 2004

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

BFD Working Group

Expires December 2004

[Page 11]

Internet Draft

BFD-DRAFT-00-MIB

June 2004

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,

BFD Working Group

Expires December 2004

[Page 12]

Internet Draft

BFD-DRAFT-00-MIB

June 2004

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...

BFD Working Group

Expires December 2004

[Page 18]

Internet Draft

BFD-DRAFT-00-MIB

June 2004

-- 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

```

BFD Working Group Expires December 2004 [Page 19]

Internet Draft BFD-DRAFT-00-MIB June 2004

```

        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

- [BFD] Katz, D., and Ward, D., "Bidirectional Forwarding Detection", [draft-katz-ward-bfd-02.txt](#) (work in progress).
- [BFDSHARED] "Bidirectional Forwarding Detection over Shared Interfaces", work in progress.
- [RFC2578] McCloghrie, K., Perkins, D., Schoenwaelder, J., Case, J., Rose, M., and S. Waldbusser, "Structure of Management Information Version 2 (SMIv2)", STD 58, [RFC 2578](#), April 1999.
- [RFC2579] McCloghrie, K., Perkins, D., Schoenwaelder, J., Case, J., Rose, M., and S. Waldbusser, "Textual Conventions for SMIv2", STD 58, [RFC 2579](#), April 1999.
- [RFC2580] McCloghrie, K., Perkins, D., Schoenwaelder, J., Case, J., Rose, M., and S. Waldbusser, "Conformance Statements for SM STD 58, [RFC 2580](#), April 1999.

[RFC2863] McCloghrie, K., Kastenholz, F., "The Interfaces Group MIB", [RFC 2863](#), June 2000.

BFD Working Group

Expires December 2004

[Page 21]

Internet Draft

BFD-DRAFT-00-MIB

June 2004

[9.2](#) Informative References

[RFC3410] Case, J., Mundy, R., Partain, D. and B. Stewart, "Introduction and Applicability Statements for Internet-Standard Management Framework", [RFC 3410](#), December 2002.

[RFC3413] Levi, D., Meyer, P., Stewart, B., "Simple Network Management Protocol (SNMP) Applications", [RFC 3413](#), December 2002.

[10](#). Author's Addresses

Thomas D. Nadeau
Cisco Systems, Inc.
300 Beaver Brook Road
Boxborough, MA 01719
Phone: +1-978-936-1470
Email: tnadeau@cisco.com

Zafar Ali
Cisco Systems Inc.
100 South Main St. #200
Ann Arbor, MI 48104, USA.
Phone: +1-734-276-2459
Email: zali@cisco.com

[16](#). Full Copyright Statement

Copyright (C) The Internet Society (2003). All Rights Reserved.

This document and translations of it may be copied and furnished to others, and derivative works that comment on or otherwise explain it or assist in its implementation may be prepared, copied, published and distributed, in whole or in part, without restriction of any kind, provided that the above copyright notice and this paragraph are included on all such copies and derivative works. However, this document itself may not be modified in any way, such as by removing the copyright notice or references to the Internet Society or other Internet organizations, except as needed for the purpose of developing Internet standards in which case the procedures for copyrights defined in the Internet Standards process must be followed, or as required to translate it into languages other than English.

The limited permissions granted above are perpetual and will not be revoked by the Internet Society or its successors or assigns. This document and the information contained herein is provided on an "AS IS" basis and THE INTERNET SOCIETY AND THE INTERNET ENGINEERING TASK FORCE DISCLAIMS ALL WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO ANY WARRANTY THAT THE USE OF THE INFORMATION HEREIN WILL NOT INFRINGE ANY RIGHTS OR ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

17. Intellectual Property Notice

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 in

BFD Working Group

Expires December 2004

[Page 22]

Internet Draft

BFD-DRAFT-00-MIB

June 2004

this document or the extent to which any license under such rights might or might not be available; neither does it represent that it has made any effort to identify any such rights. Information on the IETF's procedures with respect to rights in standards-track and standards-related documentation can be found in [BCP-11](#) [[RFC2028](#)]. 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 implementors or users of this specification can be obtained from the IETF Secretariat. The IETF invites any interested party to bring to its attention any copyrights, patents or patent applications, or other proprietary rights that may cover technology that may be required to practice this standard. Please address the information to the IETF Executive Director.

