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Bidirectional Forwarding Detection Management Information Base
draft-ietf-bfd-mib-02.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

This memo defines an portion of the Management Information Base (MIB) for use with network management protocols in the Internet community. In particular, it describes managed objects to configure and/or monitor Bi-Directional Forwarding Detection on devices supporting this feature.

This document adopts the definitions, acronyms and mechanisms described in [[BFD](#)], [[BFD-MH](#)] and [[BFD-LSP](#)]. Unless otherwise stated, the mechanisms described therein will not be re-described here.

Comments should be made directly to the BFD mailing list at rtg-bfd@ietf.org.

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

[2](#). Terminology

This document adopts the definitions, acronyms and mechanisms described in [[BFD](#)], [[BFD-MH](#)] and [[BFD-LSP](#)]. Unless otherwise stated, the mechanisms described therein will not be re-described

here.

[3.](#) The Internet-Standard Management Framework

For a detailed overview of the documents that describe the current Internet-Standard Management Framework, please refer to [section 7 of RFC 3410](#) [RFC3410].

Managed objects are accessed via a virtual information store, termed the Management Information Base or MIB. MIB objects are generally

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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.](#) Brief Description of MIB Objects

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

[4.1](#) General Variables

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

[4.2](#) Session Table (bfdSessionTable)

The session table is used to identify a BFD session between a pair of nodes.

[4.3](#) 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.

[3.4](#) 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.

5. BFD MIB Module Definitions

```
BFD-STD-MIB DEFINITIONS ::= BEGIN
```

```
IMPORTS
```

```
MODULE-IDENTITY, OBJECT-TYPE,  
Unsigned32, Counter32, Counter64,  
NOTIFICATION-TYPE, mib-2  
FROM SNMPv2-SMI -- [RFC2578]
```

```
MODULE-COMPLIANCE, OBJECT-GROUP,  
NOTIFICATION-GROUP  
FROM SNMPv2-CONF -- [RFC2580]
```

```
TEXTUAL-CONVENTION, TruthValue,  
RowStatus, StorageType, TimeStamp
```

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```
FROM SNMPv2-TC -- [RFC2579]
```

```
InetAddress, InetAddressType, InetPortNumber  
FROM INET-ADDRESS-MIB -- [RFC3291]
```

```
;
```

```
bfdMIB MODULE-IDENTITY
```

```
LAST-UPDATED "200507221200Z" -- 04 July 2005 12:00:00 EST
```

```
ORGANIZATION "IETF"
```

```
CONTACT-INFO
```

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

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

```
DESCRIPTION
```

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

```
-- Revision history.
```

```

REVISION
    "200508221200Z" -- 04 August 2005 12:00:00 EST
DESCRIPTION
    "Initial version. Published as RFC xxxx." -- RFC-editor pls fill
                                                -- in xxxx
 ::= { mib-2 XXX } -- assigned by IANA, see section 18.1 for details

-- 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
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),
        reverseConcatenatedPathDown (9)
    }

-- 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 }

bfdVersionNumber OBJECT-TYPE
    SYNTAX    Unsigned32
    MAX-ACCESS    read-only
    STATUS    current
    DESCRIPTION
        "The current version number of the BFD protocol."
    REFERENCE

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-----

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    " BFD Version 0 (draft-katz-ward-bfd-02.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-02.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,
    bfdSessRemoteDiscr          Unsigned32,
    bfdSessUdpPort              InetPortNumber,
    bfdSessState                INTEGER,
    bfdSessRemoteHeardFlag      TruthValue,
    bfdSessDiag                 Unsigned32,
    bfdSessOperMode             INTEGER,
    bfdSessDemandModeDesiredFlag TruthValue,
    bfdSessEchoFuncModeDesiredFlag TruthValue,
    bfdSessControlPlanIndepFlag TruthValue,
    bfdSessAddrType             InetAddressType,
    bfdSessAddr                 InetAddress,
    bfdSessDesiredMinTxInterval BfdInterval,
    bfdSessDesiredMinRxInterval BfdInterval,
    bfdSessDesiredMinEchoRxInterval BfdInterval,
    bfdSessDetectMult           Unsigned32,
    bfdSessStorType             StorageType,
```

```
        bfdSessRowStatus          RowStatus,
        bfdSessAuthPresFlag      TruthValue,
        bfdSessAuthenticationType INTEGER
    }
```

```
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
    a local application which owns or maintains this
    BFD session. For instance, the MPLS 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 }
```

```
bfdSessRemoteDiscr OBJECT-TYPE
    SYNTAX      Unsigned32 (1..4294967295)
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "This object specifies the session discriminator chosen
        by the remote system for this BFD session."
 ::= { bfdSessEntry 4 }
```

```
bfdSessUdpPort OBJECT-TYPE
    SYNTAX      InetPortNumber
```


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```
MAX-ACCESS    read-create
STATUS        current
DESCRIPTION
    "The UDP Port for BFD. The default value is the
    well-known value for this port."
REFERENCE
    "draft-katz-ward-bfd-02.txt and
    draft-raggarwa-mpls-bfd-00.txt"
DEFVAL { 0 }
 ::= { bfdSessEntry 5 }
```

```
bfdSessState OBJECT-TYPE
    SYNTAX     INTEGER {
        adminDown(1),
        down(2),
        init(3),
        up(4)
    }
    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),
                    asynchModeWOEchoFun(2),
                    demandModeWEchoFunction(3),
                    demandModeWOEchoFunction(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 AsynchModeWOEchoFun(2) ...

A value of DemandModeWEchoFunction(3) ...

A value of DemandModeWOEchoFunction(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 }

bfdSessControlPlanIndepFlag OBJECT-TYPE
SYNTAX TruthValue
MAX-ACCESS read-create
STATUS current
DESCRIPTION

 "This object indicates that the local system's
 ability to continue to function through a disruption of
 the control plane. Specifically, it is set
 to true(1) if the local system BFD implementation is
 independent of the control plane. Otherwise, the
 value is set to false(0)"
DEFVAL { false }
 ::= { 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 Unsigned32
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 }

bfdSessAuthPresFlag OBJECT-TYPE

SYNTAX TruthValue
MAX-ACCESS read-create
STATUS current
DESCRIPTION
 "This object indicates that the local system's
 desire to use Authentication. Specifically, it is set
 to true(1) if the local system wishes the session
 to be authenticated or false(0) if not"
DEFVAL { false }
 ::= { bfdSessEntry 21 }

bfdSessAuthenticationType OBJECT-TYPE

SYNTAX INTEGER { simplePassword(1),
 keyedMD5(2),
 meticulousKeyedMD5(3),
 keyedSHA1(4),
 meticulousKeyedSHA1(5)

 }
MAX-ACCESS read-create
STATUS current

DESCRIPTION

 "The Authentication Type used for this BFD session. This
field is valid only when the Authentication Present bit is set"

::= { bfdSessEntry 22 }

-- 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,  
  bfdSessUpTime         TimeStamp,  
  bfdSessPerfLastSessDownTime TimeStamp,  
  bfdSessPerfLastCommLostDiag BfdDiag,  
  bfdSessPerfSessUpCount Counter32,  
  bfdSessPerfDiscTime   TimeStamp,  
  
  -- High Capacity Counters  
  bfdSessPerfPktInHC    Counter64,  
  bfdSessPerfPktOutHC   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 }
```

```
bfdSessUpTime OBJECT-TYPE  
  SYNTAX      TimeStamp  
  MAX-ACCESS  read-only  
  STATUS      current  
  DESCRIPTION  
    "The value of sysUpTime on the most recent occasion at which  
the session came up. If no such up event exists this object
```

contains a zero value."
 ::= { 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 exists this object contains a zero value."

::= { bfdSessPerfEntry 5 }

bfdSessPerfSessUpCount OBJECT-TYPE

SYNTAX Counter32
MAX-ACCESS read-only
STATUS current

DESCRIPTION

"The number of times this session has gone into the Up 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 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 }

-- BFD Session Mapping Table

bfdSessMapTable OBJECT-TYPE

SYNTAX SEQUENCE OF BfdSessMapEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"The BFD Session Mapping 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-02.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 mplsInSegmentMapLabelPtrIndex (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."

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 the

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 }
```

```
-- Ed Note: We need to add notification for changes  
-- when the two ends automatically negotiate to a new detection time
```

```

-- value or when detection multiplier changes.
-- Similarly, changes in the operating mode (bfdSessOperMode)
-- also need to be notified.

-- 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 or bfdSessPerfPktOutHC
                  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 Conformance TBD...

-- Units of conformance.

bfdSessionGroup OBJECT-GROUP

OBJECTS {
 bfdSessNotificationsEnable,
 bfdAdminStatus,
 bfdVersionNumber,
 bfdSessApplicationId,
 bfdSessDiscriminator,
 bfdSessAddrType,
 bfdSessAddr,
 bfdSessRemoteDiscr,
 bfdSessUdpPort,
 bfdSessState,
 bfdSessRemoteHeardFlag,
 bfdSessDiag,
 bfdSessOperMode,
 bfdSessDemandModeDesiredFlag,
 bfdSessEchoFuncModeDesiredFlag,
 bfdSessControlPlanIndepFlag,
 bfdSessDesiredMinTxInterval,
 bfdSessDesiredMinRxInterval,
 bfdSessDesiredMinEchoRxInterval,
 bfdSessDetectMult,
 bfdSessStorType,
 bfdSessRowStatus,

```
        bfdSessMapBfdIndex,  
        bfdSessAuthPresFlag,  
        bfdSessAuthenticationType  
    }  
    STATUS    current  
    DESCRIPTION  
        "Collection of objects needed for BFD sessions."  
    ::= { bfdGroups 1 }
```

bfdSessionPerfGroup OBJECT-GROUP

```
    OBJECTS {  
        bfdSessPerfPktIn,  
        bfdSessPerfPktOut,  
        bfdSessUpTime,  
        bfdSessPerfLastSessDownTime,  
        bfdSessPerfLastCommLostDiag,  
        bfdSessPerfSessUpCount,  
        bfdSessPerfDiscTime  
    }  
    STATUS    current  
    DESCRIPTION  
        "Collection of objects needed to monitor the  
        performance of BFD sessions."  
    ::= { bfdGroups 2 }
```

bfdSessionPerfHCGroup OBJECT-GROUP

```
    OBJECTS {  
        bfdSessPerfPktInHC,  
        bfdSessPerfPktOutHC  
    }  
    STATUS    current  
    DESCRIPTION  
        "Collection of objects needed to monitor the  
        performance of BFD sessions for which the  
        values of bfdSessPerfPktIn, bfdSessPerfPktOut  
        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

6. Security Considerations

There are a number of management objects defined in this MIB module with a MAX-ACCESS clause of read-write and/or read-create. Such objects may be considered sensitive or vulnerable in some network environments. 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.

- o The bfdSessTable may be used to directly configure BFD sessions. The bfdSessMapTable can be used indirectly in the same way. Unauthorized access to objects in this table could result in disruption of traffic on the network. This is especially true if an unauthorized user configures enough tables to invoke a denial of service attack on the device where they are configured, or on a remote device where the sessions terminate.

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. These are the tables and objects and their sensitivity/vulnerability:

- o The bfdSessPerfTable both allows access to the performance characteristics of BFD sessions. Network administrators not wishing to show this information should consider this table sensitive.

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.

[7.](#) Acknowledgements

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

[8.](#) References

[8.1](#) Normative References

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[9.](#) Authors' Addresses

Thomas D. Nadeau
Cisco Systems, Inc.
300 Beaver Brook Road
Boxboro, 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

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11. IANA Considerations

There is one MIB module contained in this document. The following "IANA Considerations" subsection requests IANA for a new assignment under the mib-2 subtree. New assignments can only be made via a Standards Action as specified in [[RFC2434](#)].

11.1. IANA Considerations for BFD-STD-MIB

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The IANA is requested to assign { mib-2 XXX } to the MPLS-L3VPN-STD-MIB module specified in this document.

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