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BFD Management Information Base
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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.

Requirements Language

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 [BCP 14](#), [RFC 2119](#) [[RFC2119](#)].

Status of This Memo

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[1.](#) 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 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](#)

[\[RFC2580\]](#).

[2.](#) Introduction

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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 for [\[RFC5880\]](#), [\[RFC5881\]](#) and [\[RFC5883\]](#), BFD versions 0 and/or 1, on devices supporting this feature.

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

[3.](#) Terminology

This document adopts the definitions, acronyms and mechanisms described in [\[RFC5880\]](#), [\[RFC5881\]](#) and [\[RFC5883\]](#). Unless otherwise stated, the mechanisms described therein will not be re-described here.

[4.](#) Brief Description of MIB Objects

This section describes objects pertaining to BFD. The MIB objects are derived from [\[RFC5880\]](#), [\[RFC5881\]](#) and [\[RFC5883\]](#), and also include textual conventions defined in [\[I-D.ietf-bfd-tc-mib\]](#).

[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

counters on a per session basis. This table is an AUGMENT to the bfdSessionTable.

[4.4.](#) BFD Session Discriminator Mapping Table (bfdSessDiscMapTable)

The BFD Session Discriminator Mapping Table maps a local discriminator value to associated BFD session's BfdSessIndexTC used in the bfdSessionTable.

[4.5.](#) BFD Session IP Mapping Table (bfdSessIpMapTable)

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The BFD Session IP Mapping Table maps, given bfdSessInterface, bfdSessSrcAddrType, bfdSessSrcAddr, bfdSessDstAddrType, and bfdSessDstAddr, to an associated BFD session's BfdSessIndexTC used in the bfdSessionTable. This table SHOULD contain those BFD sessions that are of IP type.

[5.](#) BFD MIB Module Definitions

This MIB module makes references to the following documents. [[RFC2579](#)], [[RFC2580](#)], [[RFC2863](#)], [[RFC4001](#)], and [[RFC3413](#)].

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

```
IMPORTS
```

```
    MODULE-IDENTITY, OBJECT-TYPE, NOTIFICATION-TYPE,  
        mib-2, Integer32, Unsigned32, Counter32, Counter64  
    FROM SNMPv2-SMI
```

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

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

```
    InterfaceIndexOrZero  
    FROM IF-MIB
```

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

BfdSessIndexTC, BfdIntervalTC, BfdMultiplierTC, BfdDiagTC,
BfdSessTypeTC, BfdSessOperModeTC, BfdCtrlDestPortNumberTC,
BfdCtrlSourcePortNumberTC, BfdSessStateTC,
BfdSessAuthenticationTypeTC, BfdSessionAuthenticationKeyTC
FROM BFD-TC-STD-MIB;

bfdMIB MODULE-IDENTITY

LAST-UPDATED "201306261200Z" -- 26 June 2013 12:00:00 EST
ORGANIZATION "IETF Bidirectional Forwarding Detection
Working Group"

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DESCRIPTION

"Bidirectional Forwarding Management Information Base."

REVISION "201306261200Z" -- 26 June 2013 12:00:00 EST

DESCRIPTION

"Initial version. Published as RFC xxxx."

-- RFC Ed.: RFC-editor pls fill in xxxx

::= { mib-2 XXX }

-- RFC Ed.: assigned by IANA, see [section 7.1](#) for details

-- Top level components of this MIB module.

bfdNotifications OBJECT IDENTIFIER ::= { bfdMIB 0 }

bfdObjects OBJECT IDENTIFIER ::= { bfdMIB 1 }

bfdConformance OBJECT IDENTIFIER ::= { bfdMIB 2 }

bfdScalarObjects OBJECT IDENTIFIER ::= { bfdObjects 1 }

-- BFD General Variables

-- These parameters apply globally to the Systems'

-- 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 device.
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 }

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 2 }

-- 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
 "Katz, D. and D. Ward, Bidirectional Forwarding
 Detection (BFD), [RFC 5880](#), June 2012."
 ::= { 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,
 bfdSessVersionNumber Unsigned32,
 bfdSessType BfdSessTypeTC,
 bfdSessDiscriminator Unsigned32,
 bfdSessRemoteDiscr Unsigned32,
 bfdSessDestinationUdpPort BfdCtrlDestPortNumberTC,
 bfdSessSourceUdpPort BfdCtrlSourcePortNumberTC,
 bfdSessEchoSourceUdpPort InetPortNumber,
 bfdSessAdminStatus INTEGER,
 bfdSessState BfdSessStateTC,
 bfdSessRemoteHeardFlag TruthValue,
 bfdSessDiag BfdDiagTC,
 bfdSessOperMode BfdSessOperModeTC,

bfdSessDemandModeDesiredFlag TruthValue,
 bfdSessControlPlaneIndepFlag TruthValue,
 bfdSessMultipointFlag TruthValue,
 bfdSessInterface InterfaceIndexOrZero,
 bfdSessSrcAddrType InetAddressType,
 bfdSessSrcAddr InetAddress,
 bfdSessDstAddrType InetAddressType,
 bfdSessDstAddr InetAddress,

```

bfdSessGTSM                TruthValue,
bfdSessGTSMTTL             Unsigned32,
bfdSessDesiredMinTxInterval BfdIntervalTC,
bfdSessReqMinRxInterval   BfdIntervalTC,
bfdSessReqMinEchoRxInterval BfdIntervalTC,
bfdSessDetectMult         BfdMultiplierTC,
bfdSessNegotiatedInterval BfdIntervalTC,
bfdSessNegotiatedEchoInterval BfdIntervalTC,
bfdSessNegotiatedDetectMult BfdMultiplierTC,
bfdSessAuthPresFlag       TruthValue,
bfdSessAuthenticationType BfdSessAuthenticationTypeTC,
bfdSessAuthenticationKeyID Integer32,
bfdSessAuthenticationKey  BfdSessionAuthenticationKeyTC,
bfdSessStorageType        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 }
```

bfdSessVersionNumber OBJECT-TYPE

```

SYNTAX      Unsigned32 (0..7)
MAX-ACCESS read-create
STATUS      current
DESCRIPTION

```

"The version number of the BFD protocol that this session is running in. Write access is available for this object to provide ability to set desired version for this BFD session."

REFERENCE

"Katz, D. and D. Ward, Bidirectional Forwarding Detection (BFD), [RFC 5880](#), June 2012."

```
DEFVAL { 1 }
```

```
 ::= { bfdSessEntry 2 }
```

bfdSessType OBJECT-TYPE


```

SYNTAX      BfdSessTypeTC
MAX-ACCESS  read-create
STATUS      current
DESCRIPTION
    "This object specifies the type of this BFD session."
 ::= { bfdSessEntry 3 }

bfdSessDiscriminator OBJECT-TYPE
SYNTAX      Unsigned32 (1..4294967295)
MAX-ACCESS  read-create
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 (0 | 1..4294967295)
MAX-ACCESS  read-only
STATUS      current
DESCRIPTION
    "This object specifies the session discriminator chosen
    by the remote system for this BFD session. The value may
    be zero(0) if the remote discriminator is not yet known
    or if the session is in the down or adminDown(1) state."
REFERENCE
    "Section 6.8.6, from Katz, D. and D. Ward, Bidirectional
    Forwarding Detection (BFD), RFC 5880, June 2012."
 ::= { bfdSessEntry 5 }

bfdSessDestinationUdpPort OBJECT-TYPE
SYNTAX      BfdCtrlDestPortNumberTC
MAX-ACCESS  read-create
STATUS      current
DESCRIPTION
    "This object specifies the destination UDP port number
    used for this BFD session's control packets. The value
    may be zero(0) if the session is in adminDown(1) state."
DEFVAL { 0 }
 ::= { bfdSessEntry 6 }

bfdSessSourceUdpPort OBJECT-TYPE
SYNTAX      BfdCtrlSourcePortNumberTC
MAX-ACCESS  read-create
STATUS      current
DESCRIPTION
    "This object specifies the source UDP port number used

```

for this BFD session's control packets. The value may be zero(0) if the session is in adminDown(1) state. Upon creation of a new BFD session via this MIB, the value of zero(0) specified would permit the implementation to choose its own source port number."

DEFVAL { 0 }
 ::= { bfdSessEntry 7 }

bfdSessEchoSourceUdpPort OBJECT-TYPE

SYNTAX InetPortNumber

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"This object specifies the source UDP port number used for this BFD session's echo packets. The value may be zero(0) if the session is not running in the echo mode, or the session is in adminDown(1) state. Upon creation of a new BFD session via this MIB, the value of zero(0) would permit the implementation to choose its own source port number."

DEFVAL { 0 }
 ::= { bfdSessEntry 8 }

bfdSessAdminStatus OBJECT-TYPE

SYNTAX INTEGER {
 stop(1),
 start(2)
 }

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"A transition from 'stop' to 'start' will start the BFD state machine for the session. The state machine will have an initial state of down. A transition from 'start' to 'stop' will cause the BFD session to be brought down to adminDown(1). Care should be used in providing write access to this object without adequate authentication."

DEFVAL { 2 }
 ::= { bfdSessEntry 9 }

bfdSessState OBJECT-TYPE

SYNTAX BfdSessStateTC

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"BFD session state."

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DEFVAL { 2 }
 ::= { bfdSessEntry 10 }

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(2) 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."

REFERENCE

"Katz, D. and D. Ward, Bidirectional Forwarding Detection (BFD), [RFC 5880](#), June 2012."

DEFVAL { false }
 ::= { bfdSessEntry 11 }

bfdSessDiag OBJECT-TYPE

SYNTAX BfdDiagTC

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"A diagnostic code specifying the local system's reason for the last transition of the session from up(4) to some other state."

::= { bfdSessEntry 12 }

bfdSessOperMode OBJECT-TYPE

SYNTAX BfdSessOperModeTC

MAX-ACCESS read-create

STATUS current

DESCRIPTION

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

::= { bfdSessEntry 13 }

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

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Demand mode or false(2) if not"
DEFVAL { false }
::= { bfdSessEntry 14 }

bfdSessControlPlaneIndepFlag 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(2)"

DEFVAL { false }
::= { bfdSessEntry 15 }

bfdSessMultipointFlag OBJECT-TYPE

SYNTAX TruthValue
MAX-ACCESS read-create
STATUS current
DESCRIPTION

"This object indicates the Multipoint (M) bit for this session. It is set to true(1) if Multipoint (M) bit is set to 1. Otherwise, the value is set to false(2)"

DEFVAL { false }
::= { bfdSessEntry 16 }

bfdSessInterface OBJECT-TYPE

SYNTAX InterfaceIndexOrZero
MAX-ACCESS read-create

STATUS current
DESCRIPTION
"This object contains an interface index used to indicate the interface which this BFD session is running on. This value can be zero if there is no interface associated with this BFD session."
 ::= { bfdSessEntry 17 }

bfdSessSrcAddrType OBJECT-TYPE
SYNTAX InetAddressType
MAX-ACCESS read-create
STATUS current
DESCRIPTION
"This object specifies IP address type of the source IP address of this BFD session. Only values unknown(0), ipv4(1), ipv6(2), or ipv6z(4) have to be supported."

The value of unknown(0) is allowed only when the session is singleHop(1) and the source IP address of this BFD session is derived from the outgoing interface, 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 18 }

bfdSessSrcAddr OBJECT-TYPE
SYNTAX InetAddress
MAX-ACCESS read-create
STATUS current
DESCRIPTION
"This object specifies the source IP address of this BFD session."
 ::= { bfdSessEntry 19 }

bfdSessDstAddrType OBJECT-TYPE
SYNTAX InetAddressType
MAX-ACCESS read-create
STATUS current
DESCRIPTION
"This object specifies IP address type of the neighboring IP address which is being monitored with this BFD session."

Only values unknown(0), ipv4(1), ipv6(2), or ipv6z(4) have to be supported. The value of unknown(0) is allowed only when the session is singleHop(1) and 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 20 }

bfdSessDstAddr OBJECT-TYPE

SYNTAX InetAddress

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"This object specifies the neighboring IP address which is being monitored with this BFD session."

::= { bfdSessEntry 21 }

bfdSessGTSM OBJECT-TYPE

SYNTAX TruthValue

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"Setting the value of this object to true(1) will enable GTSM protection of the BFD session. GTSM MUST be enabled on a singleHop(1) session if no authentication is in use."

REFERENCE

"[RFC5082](#), The Generalized TTL Security Mechanism (GTSM).
[RFC5881, Section 5](#)"

DEFVAL { false }

::= { bfdSessEntry 22 }

bfdSessGTSM TTL OBJECT-TYPE

SYNTAX Unsigned32 (0..255)

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"This object is valid only when bfdSessGTSM protection is enabled on the system. This object specifies the minimum allowed TTL for received BFD control packets. For singleHop(1) session, if GTSM protection is enabled,

this object SHOULD be set to maximum TTL allowed for single hop. The value of zero(0) indicates that bfdSessGTSM is disabled."

REFERENCE

"[RFC5082](#), The Generalized TTL Security Mechanism (GTSM).
[RFC5881, Section 5](#)"

DEFVAL { 0 }

::= { bfdSessEntry 23 }

bfdSessDesiredMinTxInterval OBJECT-TYPE

SYNTAX BfdIntervalTC

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. The value of zero(0) is reserved, and should not be used."

REFERENCE

"[Section 4.1](#) from Katz, D. and D. Ward, Bidirectional Forwarding Detection (BFD), [RFC 5880](#), June 2012."

::= { bfdSessEntry 24 }

bfdSessReqMinRxInterval OBJECT-TYPE

SYNTAX BfdIntervalTC

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. The value of zero(0) can be specified when the transmitting system does not want the remote system to send any periodic BFD control packets."

REFERENCE

"[Section 4.1](#) from Katz, D. and D. Ward, Bidirectional Forwarding Detection (BFD), [RFC 5880](#), June 2012."

::= { bfdSessEntry 25 }

bfdSessReqMinEchoRxInterval OBJECT-TYPE

SYNTAX BfdIntervalTC

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. Value must be zero(0) if this is a multihop BFD session."

::= { bfdSessEntry 26 }

bfdSessDetectMult OBJECT-TYPE
SYNTAX BfdMultiplierTC

MAX-ACCESS read-create
STATUS current

DESCRIPTION

"This object specifies the Detect time multiplier."

::= { bfdSessEntry 27 }

bfdSessNegotiatedInterval OBJECT-TYPE

SYNTAX BfdIntervalTC

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"This object specifies the negotiated interval, in microseconds, that the local system is transmitting BFD Control packets."

::= { bfdSessEntry 28 }

bfdSessNegotiatedEchoInterval OBJECT-TYPE

SYNTAX BfdIntervalTC

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"This object specifies the negotiated interval, in microseconds, that the local system is transmitting BFD echo packets. Value is expected to be zero if the sessions is not running in echo mode."

::= { bfdSessEntry 29 }

bfdSessNegotiatedDetectMult OBJECT-TYPE

SYNTAX BfdMultiplierTC

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"This object specifies the Detect time multiplier."
::= { bfdSessEntry 30 }

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(2) if not."

REFERENCE

"Sections [4.2](#) - [4.4](#) from Katz, D. and D. Ward, Bidirectional Forwarding Detection (BFD), [RFC 5880](#), June 2012."

DEFVAL { false }
::= { bfdSessEntry 31 }

bfdSessAuthenticationType OBJECT-TYPE

SYNTAX BfdSessAuthenticationTypeTC
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. Max-access to this object as well as other authentication related objects are set to read-create in order to support management of a single key ID at a time, key rotation is not handled. Key update in practice must be done by atomic update using a set containing all affected objects in the same varBindList or otherwise risk the session dropping. Value -1 indicates that no authentication is in use for this session."

REFERENCE

"Sections [4.2](#) - [4.4](#) from Katz, D. and D. Ward, Bidirectional Forwarding Detection (BFD), [RFC 5880](#), June 2012."

DEFVAL { -1 }
::= { bfdSessEntry 32 }

bfdSessAuthenticationKeyID OBJECT-TYPE

SYNTAX Integer32 (-1 | 0..255)

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"The authentication key ID in use for this session. This object permits multiple keys to be active simultaneously. When bfdSessAuthPresFlag is false(2), then the value of this object MUST be -1. The value -1 indicates that no Authentication Key ID will be present in the optional BFD Authentication Section."

REFERENCE

"Sections [4.2](#) - [4.4](#) from Katz, D. and D. Ward, Bidirectional Forwarding Detection (BFD), [RFC 5880](#), June 2012."

DEFVAL { -1 }

::= { bfdSessEntry 33 }

bfdSessAuthenticationKey OBJECT-TYPE

SYNTAX BfdSessionAuthenticationKeyTC

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"The authentication key. When the bfdSessAuthenticationType is simplePassword(1), the value of this object is the password present in the BFD packets.

When the bfdSessAuthentication type is one of the keyed authentication types, this value is used in the computation of the key present in the BFD authentication packet."

REFERENCE

"Sections [4.2](#) - [4.4](#) from Katz, D. and D. Ward, Bidirectional Forwarding Detection (BFD), [RFC 5880](#), June 2012."

::= { bfdSessEntry 34 }

bfdSessStorageType 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 35 }

```
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 36 }
```

-- 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. bfdSessPerfDiscTime is used to
    indicate potential discontinuity for all counter objects
    in this table."
AUGMENTS    { bfdSessEntry }
 ::= { bfdSessPerfTable 1 }
```

```
BfdSessPerfEntry ::= SEQUENCE {
    bfdSessPerfCtrlPktIn      Counter32,
    bfdSessPerfCtrlPktOut    Counter32,
    bfdSessPerfCtrlPktDrop   Counter32,
    bfdSessPerfCtrlPktDropLastTime TimeStamp,
    bfdSessPerfEchoPktIn     Counter32,
    bfdSessPerfEchoPktOut    Counter32,
```

```
bfdSessPerfEchoPktDrop          Counter32,
bfdSessPerfEchoPktDropLastTime TimeStamp,
bfdSessUpTime                   TimeStamp,
bfdSessPerfLastSessDownTime     TimeStamp,
bfdSessPerfLastCommLostDiag     BfdDiagTC,
bfdSessPerfSessUpCount          Counter32,
bfdSessPerfDiscTime             TimeStamp,
```

```
-- High Capacity Counters
bfdSessPerfCtrlPktInHC          Counter64,
bfdSessPerfCtrlPktOutHC         Counter64,
bfdSessPerfCtrlPktDropHC        Counter64,
bfdSessPerfEchoPktInHC          Counter64,
bfdSessPerfEchoPktOutHC         Counter64,
bfdSessPerfEchoPktDropHC        Counter64
}
```

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

bfdSessPerfCtrlPktIn OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

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

It MUST be equal to the least significant 32 bits of bfdSessPerfCtrlPktInHC if supported, and MUST do so with the rules spelled out in [RFC 2863](#)."

::= { bfdSessPerfEntry 1 }

bfdSessPerfCtrlPktOut OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

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

It MUST be equal to the least significant 32 bits of

bfdSessPerfCtrlPktOutHC if supported, and MUST do so with the rules spelled out in [RFC 2863](#)."
 ::= { bfdSessPerfEntry 2 }

bfdSessPerfCtrlPktDrop OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The total number of BFD control messages received for this session yet dropped for being invalid.

It MUST be equal to the least significant 32 bits of bfdSessPerfCtrlPktDropHC if supported, and MUST do so with the rules spelled out in [RFC 2863](#)."

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::= { bfdSessPerfEntry 3 }

bfdSessPerfCtrlPktDropLastTime OBJECT-TYPE

SYNTAX TimeStamp

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The value of sysUpTime on the most recent occasion at which received BFD control message for this session was dropped. If no such up event exists, this object contains a zero value."

::= { bfdSessPerfEntry 4 }

bfdSessPerfEchoPktIn OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

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

It MUST be equal to the least significant 32 bits of bfdSessPerfEchoPktInHC if supported, and MUST do so with the rules spelled out in [RFC 2863](#)."

::= { bfdSessPerfEntry 5 }

bfdSessPerfEchoPktOut OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

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

It MUST be equal to the least significant 32 bits of bfdSessPerfEchoPktOutHC if supported, and MUST do so with the rules spelled out in [RFC 2863](#)."

::= { bfdSessPerfEntry 6 }

bfdSessPerfEchoPktDrop OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The total number of BFD echo messages received for this session yet dropped for being invalid.

It MUST be equal to the least significant 32 bits of

bfdSessPerfEchoPktDropHC if supported, and MUST do so with the rules spelled out in [RFC 2863](#)."

::= { bfdSessPerfEntry 7 }

bfdSessPerfEchoPktDropLastTime OBJECT-TYPE

SYNTAX TimeStamp

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The value of sysUpTime on the most recent occasion at which received BFD echo message for this session was dropped. If no such up event exists, this object contains a zero value."

::= { bfdSessPerfEntry 8 }

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 9 }

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 10 }

bfdSessPerfLastCommLostDiag OBJECT-TYPE

SYNTAX BfdDiagTC

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 11 }

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 system last rebooted."

::= { bfdSessPerfEntry 12 }

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 13 }
```

bfdSessPerfCtrlPktInHC OBJECT-TYPE

SYNTAX Counter64

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"This value represents the total number of BFD control messages received for this BFD session.

The least significant 32 bits MUST equal to bfdSessPerfCtrlPktIn, and MUST do so with the rules spelled out in [RFC 2863](#)."

```
::= { bfdSessPerfEntry 14 }
```

bfdSessPerfCtrlPktOutHC OBJECT-TYPE

SYNTAX Counter64

MAX-ACCESS read-only

STATUS current

DESCRIPTION

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

The least significant 32 bits MUST equal to bfdSessPerfCtrlPktOut, and MUST do so with the rules spelled out in [RFC 2863](#)."

```
::= { bfdSessPerfEntry 15 }
```

bfdSessPerfCtrlPktDropHC OBJECT-TYPE

SYNTAX Counter64

MAX-ACCESS read-only

STATUS current
DESCRIPTION
"This value represents the total number of BFD control messages received for this BFD session yet dropped for being invalid.

The least significant 32 bits MUST equal to bfdSessPerfCtrlPktDrop, and MUST do so with the rules spelled out in [RFC 2863](#)."
 ::= { bfdSessPerfEntry 16 }

bfdSessPerfEchoPktInHC OBJECT-TYPE
SYNTAX Counter64
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"This value represents the total number of BFD echo messages received for this BFD session.

The least significant 32 bits MUST equal to bfdSessPerfEchoPktIn, and MUST do so with the rules spelled out in [RFC 2863](#)."
 ::= { bfdSessPerfEntry 17 }

bfdSessPerfEchoPktOutHC OBJECT-TYPE
SYNTAX Counter64
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"This value represents the total number of BFD echo messages transmitted for this BFD session.

The least significant 32 bits MUST equal to bfdSessPerfEchoPktOut, and MUST do so with the rules spelled out in [RFC 2863](#)."
 ::= { bfdSessPerfEntry 18 }

bfdSessPerfEchoPktDropHC OBJECT-TYPE
SYNTAX Counter64
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"This value represents the total number of BFD echo

messages received for this BFD session yet dropped for being invalid.

The least significant 32 bits MUST equal to bfdSessPerfEchoPktDrop, and MUST do so with the rules spelled out in [RFC 2863](#)."

::= { bfdSessPerfEntry 19 }

-- BFD Session Discriminator Mapping Table

bfdSessDiscMapTable OBJECT-TYPE

SYNTAX SEQUENCE OF BfdSessDiscMapEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"The BFD Session Discriminator Mapping Table maps a local discriminator value to associated BFD session's BfdSessIndexTC used in the bfdSessionTable."

::= { bfdObjects 4 }

bfdSessDiscMapEntry OBJECT-TYPE

SYNTAX BfdSessDiscMapEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"The BFD Session Discriminator Map Entry describes BFD session that is mapped to this BfdSessIndexTC."

INDEX { bfdSessDiscriminator }

::= { bfdSessDiscMapTable 1 }

BfdSessDiscMapEntry ::= SEQUENCE {

bfdSessDiscMapIndex BfdSessIndexTC,

bfdSessDiscMapStorageType StorageType,

bfdSessDiscMapRowStatus RowStatus

}

bfdSessDiscMapIndex OBJECT-TYPE

SYNTAX BfdSessIndexTC

MAX-ACCESS read-only

STATUS current

DESCRIPTION

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

::= { bfdSessDiscMapEntry 1 }

bfdSessDiscMapStorageType OBJECT-TYPE

SYNTAX StorageType

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```
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."
 ::= { bfdSessDiscMapEntry 2 }
```

```
bfdSessDiscMapRowStatus 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
    bfdSessDiscMapRowStatus and bfdSessDiscMapStorageType."
 ::= { bfdSessDiscMapEntry 3 }
```

-- BFD Session IP Mapping Table

```
bfdSessIpMapTable OBJECT-TYPE
SYNTAX SEQUENCE OF BfdSessIpMapEntry
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
    "The BFD Session IP Mapping Table maps given
    bfdSessInterface, bfdSessSrcAddrType, bfdSessSrcAddr,
    bfdSessDstAddrType and bfdSessDstAddr
    to an associated BFD session's BfdSessIndexTC used in
    the bfdSessionTable."
 ::= { bfdObjects 5 }
```

```
bfdSessIpMapEntry OBJECT-TYPE
SYNTAX BfdSessIpMapEntry
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
    "The BFD Session IP Map Entry describes
    BFD session that is mapped to this BfdSessIndexTC."
```

```
INDEX {
    bfdSessInterface,
    bfdSessSrcAddrType,
    bfdSessSrcAddr,
    bfdSessDstAddrType,
    bfdSessDstAddr
}
```

```
    }
    ::= { bfdSessIpMapTable 1 }

BfdSessIpMapEntry ::= SEQUENCE {
    bfdSessIpMapIndex          BfdSessIndexTC,
    bfdSessIpMapStorageType    StorageType,
    bfdSessIpMapRowStatus      RowStatus
}

bfdSessIpMapIndex OBJECT-TYPE
    SYNTAX      BfdSessIndexTC
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "This object specifies the BfdSessIndexTC referred to by
        the indexes of this row. In essence, a mapping is
        provided between these indexes and the BfdSessTable."
    ::= { bfdSessIpMapEntry 1 }

bfdSessIpMapStorageType 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."
    ::= { bfdSessIpMapEntry 2 }

bfdSessIpMapRowStatus 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
bfdSessIpMapRowStatus and bfdSessIpMapStorageType."
 ::= { bfdSessIpMapEntry 3 }
```

```
-- Notification Configuration
```

```
bfdSessUp NOTIFICATION-TYPE
  OBJECTS {
    bfdSessDiag, -- low range value
    bfdSessDiag  -- high range value
```

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```
}
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(4)
  state from some other state. The included values of
  bfdSessDiag MUST both be set equal to this
  new state (i.e: up(4)). 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(4) 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(2)
    or adminDown(1) states from some other state. The included
    values of bfdSessDiag MUST both be set equal to this new
    state (i.e: down(2) or adminDown(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 down(2) or adminDown(1) 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

```

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```

        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.

-- 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 the BFD-MIB module. Such devices can then be monitored and also be configured using this MIB module."

MODULE -- This module.

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

GROUP bfdSessionPerfHCGroup
DESCRIPTION "This group is mandatory for all systems that are able to support the Counter64 date type."

OBJECT bfdSessSrcAddrType
SYNTAX InetAddressType { unknown(0), ipv4(1),
 ipv6(2), ipv6z(4) }
DESCRIPTION "Only unknown(0), ipv4(1), ipv6(2) and ipv6z(4) support are required."

OBJECT bfdSessSrcAddr
SYNTAX InetAddress (SIZE (0|4|16|20))

DESCRIPTION "An implementation is only required to support unknown(0), ipv4(1), ipv6(2) and ipv6z(4) sizes."

OBJECT bfdSessDstAddrType
SYNTAX InetAddressType { unknown(0), ipv4(1),
 ipv6(2), ipv6z(4) }
DESCRIPTION "Only unknown(0), ipv4(1), ipv6(2) and ipv6z(4) support are required."

OBJECT bfdSessDstAddr
SYNTAX InetAddress (SIZE (0|4|16|20))
DESCRIPTION "An implementation is only required to support unknown(0), ipv4(1), ipv6(2) and ipv6z(4) sizes."

OBJECT bfdSessRowStatus
SYNTAX RowStatus { active(1), notInService(2) }
WRITE-SYNTAX RowStatus { active(1), notInService(2),
createAndGo(4), destroy(6) }
DESCRIPTION "Support for createAndWait and notReady is not
required."

OBJECT bfdSessDiscMapRowStatus
SYNTAX RowStatus { active(1), notInService(2) }
WRITE-SYNTAX RowStatus { active(1), notInService(2),
createAndGo(4), destroy(6) }
DESCRIPTION "Support for createAndWait and notReady is not
required."

OBJECT bfdSessIpMapRowStatus
SYNTAX RowStatus { active(1), notInService(2) }
WRITE-SYNTAX RowStatus { active(1), notInService(2),
createAndGo(4), destroy(6) }
DESCRIPTION "Support for createAndWait and notReady is not
required."

::= { bfdCompliances 1 }

bfdModuleReadOnlyCompliance MODULE-COMPLIANCE

STATUS current

DESCRIPTION

"Compliance requirement for implementations that only
provide read-only support for BFD-MIB. Such devices
can then be monitored but cannot be configured using
this MIB module."

MODULE -- This module.

MANDATORY-GROUPS {

 bfdSessionGroup,
 bfdSessionReadOnlyGroup,
 bfdSessionPerfGroup,
 bfdNotificationGroup
}

GROUP bfdSessionPerfHCGroup

DESCRIPTION "This group is mandatory for all systems that are able to support the Counter64 date type."

OBJECT bfdSessVersionNumber
MIN-ACCESS read-only
DESCRIPTION "Write access is not required."

OBJECT bfdSessType
MIN-ACCESS read-only
DESCRIPTION "Write access is not required."

OBJECT bfdSessDiscriminator
MIN-ACCESS read-only
DESCRIPTION "Write access is not required."

OBJECT bfdSessDestinationUdpPort
MIN-ACCESS read-only
DESCRIPTION "Write access is not required."

OBJECT bfdSessSourceUdpPort
MIN-ACCESS read-only
DESCRIPTION "Write access is not required."

OBJECT bfdSessEchoSourceUdpPort
MIN-ACCESS read-only
DESCRIPTION "Write access is not required."

OBJECT bfdSessAdminStatus
MIN-ACCESS read-only
DESCRIPTION "Write access is not required."

OBJECT bfdSessOperMode
MIN-ACCESS read-only
DESCRIPTION "Write access is not required."

OBJECT bfdSessDemandModeDesiredFlag
MIN-ACCESS read-only
DESCRIPTION "Write access is not required."

OBJECT bfdSessControlPlaneIndepFlag
MIN-ACCESS read-only

DESCRIPTION "Write access is not required."

OBJECT bfdSessMultipointFlag
MIN-ACCESS read-only
DESCRIPTION "Write access is not required."

OBJECT bfdSessInterface
MIN-ACCESS read-only
DESCRIPTION "Write access is not required."

OBJECT bfdSessSrcAddrType
SYNTAX InetAddressType { unknown(0), ipv4(1),
ipv6(2), ipv6z(4) }
MIN-ACCESS read-only
DESCRIPTION "Only unknown(0), ipv4(1), ipv6(2) and ipv6z(4)
support are required."

OBJECT bfdSessSrcAddr
SYNTAX InetAddress (SIZE (0|4|16|20))
MIN-ACCESS read-only
DESCRIPTION "An implementation is only required to support
unknown(0), ipv4(1), ipv6(2) and ipv6z(4) sizes."

OBJECT bfdSessDstAddrType
SYNTAX InetAddressType { unknown(0), ipv4(1),
ipv6(2), ipv6z(4) }
MIN-ACCESS read-only
DESCRIPTION "Only unknown(0), ipv4(1), ipv6(2) and ipv6z(4)
support are required."

OBJECT bfdSessDstAddr
SYNTAX InetAddress (SIZE (0|4|16|20))
MIN-ACCESS read-only
DESCRIPTION "An implementation is only required to support
unknown(0), ipv4(1), ipv6(2) and ipv6z(4) sizes."

OBJECT bfdSessGTSM
MIN-ACCESS read-only
DESCRIPTION "Write access is not required."

OBJECT bfdSessGTSM TTL
MIN-ACCESS read-only
DESCRIPTION "Write access is not required."

OBJECT bfdSessDesiredMinTxInterval
MIN-ACCESS read-only
DESCRIPTION "Write access is not required."

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OBJECT bfdSessReqMinRxInterval
MIN-ACCESS read-only
DESCRIPTION "Write access is not required."

OBJECT bfdSessReqMinEchoRxInterval
MIN-ACCESS read-only
DESCRIPTION "Write access is not required."

OBJECT bfdSessDetectMult
MIN-ACCESS read-only
DESCRIPTION "Write access is not required."

OBJECT bfdSessAuthPresFlag
MIN-ACCESS read-only
DESCRIPTION "Write access is not required."

OBJECT bfdSessAuthenticationType
MIN-ACCESS read-only
DESCRIPTION "Write access is not required."

OBJECT bfdSessAuthenticationKeyID
MIN-ACCESS read-only
DESCRIPTION "Write access is not required."

OBJECT bfdSessAuthenticationKey
MIN-ACCESS read-only
DESCRIPTION "Write access is not required."

OBJECT bfdSessStorageType
MIN-ACCESS read-only
DESCRIPTION "Write access is not required."

OBJECT bfdSessRowStatus
SYNTAX RowStatus { active(1) }
MIN-ACCESS read-only
DESCRIPTION "Write access is not required."

OBJECT bfdSessDiscMapStorageType
MIN-ACCESS read-only
DESCRIPTION "Write access is not required."

OBJECT bfdSessDiscMapRowStatus
SYNTAX RowStatus { active(1) }

MIN-ACCESS read-only
DESCRIPTION "Write access is not required."

OBJECT bfdSessIpMapStorageType
MIN-ACCESS read-only

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DESCRIPTION "Write access is not required."

OBJECT bfdSessIpMapRowStatus
SYNTAX RowStatus { active(1) }
MIN-ACCESS read-only
DESCRIPTION "Write access is not required."

::= { bfdCompliances 2 }

-- Units of conformance.

bfdSessionGroup OBJECT-GROUP
OBJECTS {
 bfdAdminStatus,
 bfdSessNotificationsEnable,
 bfdSessVersionNumber,
 bfdSessType,
 bfdSessDiscriminator,
 bfdSessDestinationUdpPort,
 bfdSessSourceUdpPort,
 bfdSessEchoSourceUdpPort,
 bfdSessAdminStatus,
 bfdSessOperMode,
 bfdSessDemandModeDesiredFlag,
 bfdSessControlPlaneIndepFlag,
 bfdSessMultipointFlag,
 bfdSessInterface,
 bfdSessSrcAddrType,
 bfdSessSrcAddr,
 bfdSessDstAddrType,
 bfdSessDstAddr,
 bfdSessGTSM,
 bfdSessGTSM TTL,
 bfdSessDesiredMinTxInterval,
 bfdSessReqMinRxInterval,
 bfdSessReqMinEchoRxInterval,

```
    bfdSessDetectMult,  
    bfdSessAuthPresFlag,  
    bfdSessAuthenticationType,  
    bfdSessAuthenticationKeyID,  
    bfdSessAuthenticationKey,  
    bfdSessStorageType,  
    bfdSessRowStatus,  
    bfdSessDiscMapStorageType,  
    bfdSessDiscMapRowStatus,  
    bfdSessIpMapStorageType,  
    bfdSessIpMapRowStatus  
}
```

```
STATUS      current  
DESCRIPTION  
    "Collection of objects needed for BFD sessions."  
 ::= { bfdGroups 1 }  
  
bfdSessionReadOnlyGroup OBJECT-GROUP  
OBJECTS {  
    bfdSessRemoteDiscr,  
    bfdSessState,  
    bfdSessRemoteHeardFlag,  
    bfdSessDiag,  
    bfdSessNegotiatedInterval,  
    bfdSessNegotiatedEchoInterval,  
    bfdSessNegotiatedDetectMult,  
    bfdSessDiscMapIndex,  
    bfdSessIpMapIndex  
}  
STATUS      current  
DESCRIPTION  
    "Collection of read-only objects needed for BFD sessions."  
 ::= { bfdGroups 2 }  
  
bfdSessionPerfGroup OBJECT-GROUP  
OBJECTS {  
    bfdSessPerfCtrlPktIn,  
    bfdSessPerfCtrlPktOut,  
    bfdSessPerfCtrlPktDrop,  
    bfdSessPerfCtrlPktDropLastTime,  
    bfdSessPerfEchoPktIn,
```

```

        bfdSessPerfEchoPktOut,
        bfdSessPerfEchoPktDrop,
        bfdSessPerfEchoPktDropLastTime,
        bfdSessUpTime,
        bfdSessPerfLastSessDownTime,
        bfdSessPerfLastCommLostDiag,
        bfdSessPerfSessUpCount,
        bfdSessPerfDiscTime
    }
    STATUS      current
    DESCRIPTION
        "Collection of objects needed to monitor the
         performance of BFD sessions."
    ::= { bfdGroups 3 }

```

```

bfdSessionPerfHCGroup OBJECT-GROUP
    OBJECTS {
        bfdSessPerfCtrlPktInHC,
        bfdSessPerfCtrlPktOutHC,

```

```

        bfdSessPerfCtrlPktDropHC,
        bfdSessPerfEchoPktInHC,
        bfdSessPerfEchoPktOutHC,
        bfdSessPerfEchoPktDropHC
    }
    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 4 }

```

```

bfdNotificationGroup NOTIFICATION-GROUP
    NOTIFICATIONS {
        bfdSessUp,
        bfdSessDown
    }
    STATUS      current
    DESCRIPTION
        "Set of notifications implemented in this
         module."

```

```
::= { bfdGroups 5 }
```

END

6. Security Considerations

As BFD may be tied into the stability of the network infrastructure (such as routing protocols), the effects of an attack on a BFD session may be very serious. This ultimately has denial-of-service effects, as links may be declared to be down (or falsely declared to be up.) As such, improper manipulation of the objects represented by this MIB may result in denial of service to a large number of end-users.

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. The support for SET operations in a non-secure environment without proper protection can have a negative effect on network operations. These are the tables and objects and their sensitivity/vulnerability:

- o bfdSessAdminStatus - Improper change of bfdSessAdminStatus, from start to stop, can cause significant disruption of the connectivity to those portions of the Internet reached via the applicable remote BFD peer.
- o bfdSessDesiredMinTxInterval, bfdSessReqMinRxInterval, bfdSessReqMinEchoRxInterval, bfdSessDetectMult - Improper change of this object can cause connections to be disrupted for extremely long time periods when otherwise they would be restored in a relatively short period of time.

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.

The bfdSessAuthenticationType, bfdSessAuthenticationKeyID, and bfdSessAuthenticationKey objects hold security methods and associated security keys of BFD sessions. These objects SHOULD be considered highly sensitive objects. In order for these sensitive information from being improperly accessed, implementers MAY wish to disallow read and create access to these objects.

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. IANA Considerations

The MIB module in this document uses the following IANA-assigned OBJECT IDENTIFIER values recorded in the SMI Numbers registry:

Descriptor -----	OBJECT IDENTIFIER value -----
bfdMib	{ mib-2 XXX }

[Editor's Note (to be removed prior to publication): the IANA is requested to assign a value for "XXX" under the 'mib-2' subtree and to record the assignment in the SMI Numbers registry. When the assignment has been made, the RFC Editor is asked to replace "XXX" (here and in the MIB module) with the assigned value and to remove this note.]

This document also requests IANA to manage the registry for the BfdDiagTC object.

8. References

8.1. Normative References

- [RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", [BCP 14](#), [RFC 2119](#), March 1997.
- [RFC2578] McCloghrie, K., Ed., Perkins, D., Ed., and J. Schoenwaelder, Ed., "Structure of Management Information Version 2 (SMIv2)", STD 58, [RFC 2578](#), April 1999.

Schoenwaelder, Ed., "Textual Conventions for SMIV2", STD 58, [RFC 2579](#), April 1999.

- [RFC2580] McCloghrie, K., Perkins, D., and J. Schoenwaelder, "Conformance Statements for SMIV2", STD 58, [RFC 2580](#), April 1999.
- [RFC5880] Katz, D. and D. Ward, "Bidirectional Forwarding Detection (BFD)", [RFC 5880](#), June 2010.
- [RFC5881] Katz, D. and D. Ward, "Bidirectional Forwarding Detection (BFD) for IPv4 and IPv6 (Single Hop)", [RFC 5881](#), June 2010.
- [RFC5883] Katz, D. and D. Ward, "Bidirectional Forwarding Detection (BFD) for Multihop Paths", [RFC 5883](#), June 2010.
- [I-D.ietf-bfd-tc-mib] Nadeau, T., Ali, Z., and N. Akiya, "Definitions of Textual Conventions (TCs) for Bidirectional Forwarding Detection (BFD) Management", [draft-ietf-bfd-tc-mib-02](#) (work in progress), June 2013.

[8.2.](#) 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.
- [RFC4001] Daniele, M., Haberman, B., Routhier, S., and J. Schoenwaelder, "Textual Conventions for Internet Network Addresses", [RFC 4001](#), February 2005.
- [RFC2863] McCloghrie, K. and F. Kastenholz, "The Interfaces Group MIB", [RFC 2863](#), June 2000.
- [RFC3413] Levi, D., Meyer, P., and B. Stewart, "Simple Network Management Protocol (SNMP) Applications", STD 62, [RFC 3413](#), December 2002.

[Appendix A.](#) Acknowledgments

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