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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", "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.](#) Introduction

This memo 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 to configure and/or monitor Bidirectional Forwarding Detection for [[RFC5880](#)], [[RFC5881](#)], [[RFC5883](#)] and [[RFC7130](#)], BFD versions 0 and/or 1, on devices supporting this feature.

This memo does not define a compliance requirement for a system that only implements BFD version 0. This is a reflection of a considered and deliberate decision by the BFD WG, because the BFD version 0 protocol is primarily of historical interest by comparison to the widespread deployment of the BFD version 1 protocol.

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

For a detailed overview of the documents that describe the current

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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](#)].

As with all MIB modules, an attempt to SET or CREATE an object to a value that is not supported by the implementation will result in a failure using a return code that indicates that the value is not supported.

[3.](#) Terminology

This document adopts the definitions, acronyms and mechanisms described in [[RFC5880](#)], [[RFC5881](#)], [[RFC5883](#)] and [[RFC7130](#)]. 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](#)], [[RFC5883](#)] and [[RFC7130](#)], 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 provides a mapping between a local discriminator value to the associated BFD session found in the bfdSessionTable.

4.5. BFD Session IP Mapping Table (bfdSessIpMapTable)

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

5. BFD MIB Module Definitions

This MIB module makes references to the following documents.

[[RFC2578](#)], [[RFC2579](#)], [[RFC2580](#)], [[RFC2863](#)], [[RFC3289](#)], [[RFC3413](#)], [[RFC5082](#)] and [[RFC5880](#)].

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

```
IMPORTS
```

```
    MODULE-IDENTITY, OBJECT-TYPE, NOTIFICATION-TYPE,  
        mib-2, Integer32, Unsigned32, Counter32, Counter64  
    FROM SNMPv2-SMI -- [RFC2578]
```

```
    TruthValue, RowStatus, StorageType, TimeStamp  
    FROM SNMPv2-TC -- [RFC2579]
```

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

```
    InterfaceIndexOrZero  
    FROM IF-MIB -- [RFC2863]
```

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

```
    IndexIntegerNextFree  
    FROM DIFFSERV-MIB -- [RFC3289]
```

```
    BfdSessIndexTC, BfdIntervalTC, BfdMultiplierTC,  
    BfdCtrlDestPortNumberTC, BfdCtrlSourcePortNumberTC  
    FROM BFD-TC-STD-MIB
```

```
    IANAbfdDiagTC, IANAbfdSessTypeTC, IANAbfdSessOperModeTC,  
    IANAbfdSessStateTC, IANAbfdSessAuthenticationTypeTC,  
    IANAbfdSessAuthenticationKeyTC
```


FROM IANA-BFD-TC-STD-MIB;

bfdMIB MODULE-IDENTITY

LAST-UPDATED "201405091200Z" -- 9 May 2014 12:00:00 EST

ORGANIZATION "IETF Bidirectional Forwarding Detection
Working Group"

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Comments about this document should be emailed directly
to the BFD working group mailing list at
rtg-bfd@ietf.org"

DESCRIPTION

"Bidirectional Forwarding Management Information Base."

REVISION "201405091200Z" -- 9 May 2014 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),
        adminDown(3),
        down(4)
    }
    MAX-ACCESS read-write
    STATUS      current
    DESCRIPTION
        "The desired global administrative status of the BFD
        system in this device."
    ::= { bfdScalarObjects 1 }

bfdOperStatus OBJECT-TYPE
    SYNTAX      INTEGER {
        up(1),
        down(2),
        adminDown(3)
    }
    MAX-ACCESS read-only
    STATUS      current
    DESCRIPTION
        "Indicates the actual operational status of the
        BFD system in this device. When this value is
        down(2), all entries in the bfdSessTable MUST have
        their bfdSessOperStatus as down(2) as well. When
        this value is adminDown(3), all entries in the
        bfdSessTable MUST have their bfdSessOperStatus
        as adminDown(3) as well."
    ::= { bfdScalarObjects 2 }

bfdNotificationsEnable 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 3 }

bfdSessIndexNext OBJECT-TYPE
```

SYNTAX

IndexIntegerNextFree (0..4294967295)

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```

MAX-ACCESS      read-only
STATUS          current
DESCRIPTION
    "This object contains an unused value for
    bfdSessIndex that can be used when creating
    entries in the table. A zero indicates that
    no entries are available, but MUST NOT be used
    as a valid index. "
 ::= { bfdScalarObjects 4 }

```

```

-- 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           IANAbfdSessTypeTC,
    bfdSessDiscriminator  Unsigned32,
    bfdSessRemoteDiscr    Unsigned32,
    bfdSessDestinationUdpPort  BfdCtrlDestPortNumberTC,
    bfdSessSourceUdpPort  BfdCtrlSourcePortNumberTC,
    bfdSessEchoSourceUdpPort  InetPortNumber,
    bfdSessAdminStatus    INTEGER,
    bfdSessOperStatus     INTEGER,
    bfdSessState           IANAbfdSessStateTC,
    bfdSessRemoteHeardFlag TruthValue,

```

bfdSessDiag

IANAbfdDiagTC,

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bfdSessOperMode	IANA 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	IANA bfdSessAuthenticationTypeTC,
bfdSessAuthenticationKeyID	Integer32,
bfdSessAuthenticationKey	IANA bfdSessAuthenticationKeyTC,
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. Managers should obtain new values for row creation in this table by reading bfdSessIndexNext."

::= { 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

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

DEFVAL { 1 }

::= { bfdSessEntry 2 }

bfdSessType OBJECT-TYPE

SYNTAX IANAbfdSessTypeTC

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

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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 {
enabled(1),
disabled(2),
adminDown(3),
down(4)
}

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"Denotes the desired operational status of the BFD Session.

A transition to enabled(1) will start the BFD state machine for the session. The state machine will have an initial state of down(2).

A transition to disabled(2) will stop the BFD state machine for the session. The state machine may first transition to adminDown(1) prior to stopping.

A transition to adminDown(3) will cause the BFD state machine to transition to adminDown(1), and will cause the session to remain in this state.

A transition to down(4) will cause the BFD state machine to transition to down(2), and will cause the session to remain in this state.

Care should be used in providing write access to this object without adequate authentication."

```
::= { bfdSessEntry 9 }
```

bfdSessOperStatus OBJECT-TYPE

```
SYNTAX      INTEGER {
                                up(1),
                                down(2),
                                adminDown(3)
                        }
```

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Denotes the actual operational status of the BFD Session. If the value of bfdOperStatus is down(2), this value MUST eventually be down(2) as well. If the value of bfdOperStatus is adminDown(3), this value MUST eventually be adminDown(3) as well."

```
::= { bfdSessEntry 10 }
```

bfdSessState OBJECT-TYPE

```
SYNTAX      IANAbfdSessStateTC
```

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Configured BFD session state."

```
::= { bfdSessEntry 11 }
```

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."

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REFERENCE

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

::= { bfdSessEntry 12 }

bfdSessDiag OBJECT-TYPE

SYNTAX IANAbfdDiagTC

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 13 }

bfdSessOperMode OBJECT-TYPE

SYNTAX IANAbfdSessOperModeTC

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"This object specifies the operational mode of this
BFD session."

::= { bfdSessEntry 14 }

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(2) if not"

DEFVAL { false }

::= { bfdSessEntry 15 }

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)"

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```
DEFVAL { false }  
::= { bfdSessEntry 16 }
```

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 17 }
```

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 18 }
```

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. 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 19 }
```

bfdSessSrcAddr OBJECT-TYPE

```
SYNTAX      InetAddress  
MAX-ACCESS  read-create  
STATUS      current  
DESCRIPTION  
    "This object specifies the source IP address of this BFD  
    session. The format of this object is controlled by the
```

bfdSessSrcAddrType object."

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```
::= { bfdSessEntry 20 }
```

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. 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 21 }
```

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. The format of this object is controlled by the bfdSessDstAddrType object."

```
::= { bfdSessEntry 22 }
```

bfdSessGTSM OBJECT-TYPE

SYNTAX TruthValue

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"Setting the value of this object to false(2) will disable 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 { true }

```
::= { bfdSessEntry 23 }
```

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 indicates the minimum

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allowed TTL for received BFD control packets. For a singleHop(1) session, if GTSM protection is enabled, this object SHOULD be set to maximum TTL value allowed for single hop.

By default, GTSM is enabled and TTL value is 255. For a multihop session, updating of maximum TTL value allowed is likely required."

REFERENCE

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

DEFVAL { 255 }

::= { bfdSessEntry 24 }

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 in this case, and should not be used."

REFERENCE

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

::= { bfdSessEntry 25 }

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 26 }

bfdSessReqMinEchoRxInterval OBJECT-TYPE

SYNTAX BfdIntervalTC

MAX-ACCESS read-create

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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 27 }

bfdSessDetectMult OBJECT-TYPE

SYNTAX BfdMultiplierTC

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"This object specifies the Detect time multiplier."

::= { bfdSessEntry 28 }

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 29 }

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 30 }

bfdSessNegotiatedDetectMult OBJECT-TYPE

SYNTAX BfdMultiplierTC

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"This object specifies the Detect time multiplier."

::= { bfdSessEntry 31 }

bfdSessAuthPresFlag OBJECT-TYPE

SYNTAX TruthValue

MAX-ACCESS read-create

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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 32 }

bfdSessAuthenticationType OBJECT-TYPE

SYNTAX IANAbfdSessAuthenticationTypeTC

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."

REFERENCE

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

DEFVAL { noAuthentication }

::= { bfdSessEntry 33 }

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. 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 }

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```
::= { bfdSessEntry 34 }
```

bfdSessAuthenticationKey OBJECT-TYPE

SYNTAX IANAbfdSessAuthenticationKeyTC

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 bfdSessAuthenticationType 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 35 }
```

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 36 }
```

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 37 }
```

-- BFD Session Performance Table

bfdSessPerfTable OBJECT-TYPE

SYNTAX SEQUENCE OF BfdSessPerfEntry

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```

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 IANAbfdDiagTC,
    bfdSessPerfSessUpCount     Counter32,
    bfdSessPerfDiscTime        TimeStamp,

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

```

```

bfdSessPerfCtrlPktIn OBJECT-TYPE
    SYNTAX      Counter32
    MAX-ACCESS read-only
    STATUS      current
    DESCRIPTION

```

"The total number of BFD control messages received for this

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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](#)."

::= { 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 has been issued, 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 event has been issued,
 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 down event has been issued this object
 contains a zero value."
 ::= { bfdSessPerfEntry 10 }

bfdSessPerfLastCommLostDiag OBJECT-TYPE

SYNTAX IANAbfdDiagTC
MAX-ACCESS read-only
STATUS current
DESCRIPTION
 "The BFD diag code for the last time communication was lost
 with the neighbor. If such an event has not been issued
 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

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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


```
        bfdSessIndex found in the bfdSessionTable."
 ::= { bfdObjects 4 }
```

bfdSessDiscMapEntry OBJECT-TYPE

SYNTAX BfdSessDiscMapEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"The BFD Session Discriminator Mapping Entry specifies a mapping between a local discriminator and a BFD session."

INDEX { bfdSessDiscriminator }

::= { bfdSessDiscMapTable 1 }

BfdSessDiscMapEntry ::= SEQUENCE {

bfdSessDiscMapIndex BfdSessIndexTC

}

bfdSessDiscMapIndex OBJECT-TYPE

SYNTAX BfdSessIndexTC

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"This object specifies a mapping between a local discriminator and a BFD Session in the BfdSessTable."

::= { bfdSessDiscMapEntry 1 }

-- 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 found in the bfdSessionTable."

::= { bfdObjects 5 }

bfdSessIpMapEntry OBJECT-TYPE

SYNTAX BfdSessIpMapEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"The BFD Session IP Map Entry contains a mapping from the IP information for a session, to the session in the bfdSessionTable."

```
INDEX {
    bfdSessInterface,
    bfdSessSrcAddrType,
    bfdSessSrcAddr,
    bfdSessDstAddrType,
    bfdSessDstAddr
}
::= { bfdSessIpMapTable 1 }
```

```
BfdSessIpMapEntry ::= SEQUENCE {
    bfdSessIpMapIndex          BfdSessIndexTC
}
```

```
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 }
```

-- Notification Configuration

```
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(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
    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

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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. ipv4z(3) is not required and dns(16) is not allowed."

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. ipv4z(3) is not required and dns(16) is not allowed."

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."

::= { 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. ipv4z(3) is not required and dns(16) is not allowed."
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. ipv4z(3) is not required and dns(16) is not allowed."
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	bfdSessGTSMttl
MIN-ACCESS	read-only
DESCRIPTION	"Write access is not required."
OBJECT	bfdSessDesiredMinTxInterval
MIN-ACCESS	read-only
DESCRIPTION	"Write access is not required."
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."
::= { bfdCompliances 2 }
```

-- Units of conformance.

```
bfdSessionGroup OBJECT-GROUP
OBJECTS {
    bfdAdminStatus,
    bfdOperStatus,
    bfdNotificationsEnable,
    bfdSessVersionNumber,
    bfdSessType,
    bfdSessIndexNext,
    bfdSessDiscriminator,
    bfdSessDestinationUdpPort,
    bfdSessSourceUdpPort,
    bfdSessEchoSourceUdpPort,
    bfdSessAdminStatus,
    bfdSessOperStatus,
    bfdSessOperMode,
    bfdSessDemandModeDesiredFlag,
    bfdSessControlPlaneIndepFlag,
    bfdSessMultipointFlag,
    bfdSessInterface,
    bfdSessSrcAddrType,
    bfdSessSrcAddr,
    bfdSessDstAddrType,
    bfdSessDstAddr,
    bfdSessGTSM,
    bfdSessGTSM TTL,
    bfdSessDesiredMinTxInterval,
    bfdSessReqMinRxInterval,
    bfdSessReqMinEchoRxInterval,
    bfdSessDetectMult,
    bfdSessAuthPresFlag,
    bfdSessAuthenticationType,
    bfdSessAuthenticationKeyID,
    bfdSessAuthenticationKey,
    bfdSessStorageType,
    bfdSessRowStatus
}
STATUS      current
DESCRIPTION
```

"Collection of objects needed for BFD sessions."

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```
::= { 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,

Nadeau/Nobo/Ali

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```

        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 bfdAdminStatus - Improper change of bfdAdminStatus, to disabled(2), adminDown(3) or down(4), can cause significant disruption of the connectivity to those portions of the Internet reached via all the applicable remote BFD peers.
- o bfdSessAdminStatus - Improper change of bfdSessAdminStatus, to

disabled(2), adminDown(3) or down(4), can cause significant disruption of the connectivity to those portions of the Internet reached via all the applicable remote BFD peers.

- 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.
- o Some management objects define the BFD session whilst other management objects define the parameter of the BFD session. It is particularly important to control the support for SET access to those management objects that define the BFD session, as changes to them can be disruptive. Implementation SHOULD NOT allow changes to following management objects when bfdSessState is up(4):

- * bfdSessVersionNumber
- * bfdSessType
- * bfdSessDestinationUdpPort
- * bfdSessMultipointFlag
- * bfdSessInterface
- * bfdSessSrcAddrType
- * bfdSessSrcAddr
- * bfdSessDstAddrType
- * bfdSessDstAddr

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 to prevent this sensitive information from being improperly accessed, implementers MAY disallow 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
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```
-----  
bfdMib          { mib-2 XXX }
```

[RFC-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.]

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9. References

9.1. 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.
- [RFC2579] McCloghrie, K., Ed., Perkins, D., Ed., and J. 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.
- [RFC5082] Gill, V., Heasley, J., Meyer, D., Savola, P., and C. Pignataro, "The Generalized TTL Security Mechanism (GTSM)", [RFC 5082](#), October 2007.
- [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.
- [RFC7130] Bhatia, M., Chen, M., Boutros, S., Binderberger, M., and J. Haas, "Bidirectional Forwarding Detection (BFD) on Link Aggregation Group (LAG) Interfaces", [RFC 7130](#), February 2014.
- [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-08](#) (work in progress), April 2014.

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.
- [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.
- [RFC3289] Baker, F., Chan, K., and A. Smith, "Management Information Base for the Differentiated Services Architecture", [RFC 3289](#), May 2002.

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