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## Definitions of Textual Conventions (TCs) for Bidirectional Forwarding Detection (BFD) Management

### Abstract

This document defines two Management Information Base (MIB) modules that contain Textual Conventions to represent commonly used Bidirectional Forwarding Detection (BFD) management information. The intent is that these TEXTUAL CONVENTIONS (TCs) will be imported and used in BFD-related MIB modules that would otherwise define their own representations.

### Status of This Memo

This is an Internet Standards Track document.

This document is a product of the Internet Engineering Task Force (IETF). It represents the consensus of the IETF community. It has received public review and has been approved for publication by the Internet Engineering Steering Group (IESG). Further information on Internet Standards is available in [Section 2 of RFC 5741](#).

Information about the current status of this document, any errata, and how to provide feedback on it may be obtained at <http://www.rfc-editor.org/info/rfc7330>.

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## 1. Introduction

This document defines two MIB modules that contain Textual Conventions for Bidirectional Forwarding Detection (BFD) protocols. These Textual Conventions should be imported by MIB modules that manage BFD protocols.

Note that names of Textual Conventions defined in this document are prefixed with either "Bfd" or "IANA" to make it obvious to readers that some are specific to BFD modules, whereas others are IANA maintained.

For an introduction to the concepts of BFD, see [RFC5880], [RFC5881], [RFC5883], [RFC6428], and [RFC7130].

## 1.1. 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].

## 2. 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].

### 3. BFD Textual Conventions MIB Definitions

This MIB module makes references to the following documents: [RFC2578], [RFC2579], [RFC5880], [RFC5881], [RFC5883], [RFC6428], and [RFC7130].

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

```
IMPORTS
```

```
    MODULE-IDENTITY, mib-2, Unsigned32
    FROM SNMPv2-SMI                                -- RFC 2578
```

```
    TEXTUAL-CONVENTION
    FROM SNMPv2-TC;                                -- RFC 2579
```

```
bfdTCStdMib MODULE-IDENTITY
```

```
    LAST-UPDATED
        "201408120000Z" -- 12 August 2014 00:00:00 GMT
```

```
    ORGANIZATION "IETF Bidirectional Forwarding Detection
        Working Group"
```

```
    CONTACT-INFO
```

```
        "Thomas D. Nadeau
        Brocade
        Email: tnadeau@lucidvision.com
```

```

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

```

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        Cisco Systems, Inc.
        Email: nobo@cisco.com
```

```

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

```
    DESCRIPTION
```

```
        "Copyright (c) 2014 IETF Trust and the persons identified as
        authors of the code. All rights reserved.
```

```

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```

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REVISION "201408120000Z" -- 12 August 2014 00:00:00 GMT

DESCRIPTION

"Initial version. Published as [RFC 7330](#)."

::= { mib-2 223 }

BfdSessIndexTC ::= TEXTUAL-CONVENTION

DISPLAY-HINT "d"

STATUS current

DESCRIPTION

"An index used to uniquely identify BFD sessions."

SYNTAX Unsigned32 (1..4294967295)

BfdIntervalTC ::= TEXTUAL-CONVENTION

DISPLAY-HINT "d"

STATUS current

DESCRIPTION

"The BFD interval in microseconds."

SYNTAX Unsigned32 (0..4294967295)

BfdMultiplierTC ::= TEXTUAL-CONVENTION

DISPLAY-HINT "d"

STATUS current

DESCRIPTION

"The BFD failure detection multiplier."

SYNTAX Unsigned32 (1..255)

BfdCtrlDestPortNumberTC ::= TEXTUAL-CONVENTION

DISPLAY-HINT "d"

STATUS current

DESCRIPTION

"UDP destination port number of BFD control packets.

3784 represents single-hop BFD session.

4784 represents multi-hop BFD session.

6784 represents BFD on Link Aggregation Group (LAG) session.

However, syntax is left open to wider range of values purposely for two reasons:

1. Implementation uses non-compliant port number for valid proprietary reason.
2. Potential future extension documents.

The value of 0 is a special, reserved value used to indicate special conditions and should not be considered a valid port number."

## REFERENCE

"Use of port 3784 from Katz, D. and D. Ward, Bidirectional Forwarding Detection (BFD) for IPv4 and IPv6 (Single Hop), [RFC 5881](#), June 2010.

Use of port 4784 from Katz, D. and D. Ward, Bidirectional Forwarding Detection (BFD) for Multihop Paths, [RFC 5883](#), June 2010.

Use of port 6784 from 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."

SYNTAX Unsigned32 (0..65535)

BfdCtrlSourcePortNumberTC ::= TEXTUAL-CONVENTION

DISPLAY-HINT "d"

STATUS current

## DESCRIPTION

"UDP source port number of BFD control packets. However, syntax is left open to wider range of values purposely for two reasons:

1. Implementation uses non-compliant port number for valid proprietary reason.
2. Potential future extension documents.

The value of 0 is a special, reserved value used to indicate special conditions and should not be considered a valid port number."

## REFERENCE

"Port 49152..65535 from [RFC5881](#)"

SYNTAX Unsigned32 (0..65535)

END

IANA-BFD-TC-STD-MIB DEFINITIONS ::= BEGIN

## IMPORTS

MODULE-IDENTITY, mib-2  
FROM SNMPv2-SMI

-- [RFC 2578](#)

TEXTUAL-CONVENTION  
FROM SNMPv2-TC;

-- [RFC 2579](#)

## ianaBfdTCStdMib MODULE-IDENTITY

## LAST-UPDATED

"201408120000Z" -- 12 August 2014 00:00:00 GMT

## ORGANIZATION

"IANA"

## CONTACT-INFO

"Internet Assigned Numbers Authority  
Postal: 12025 Waterfront Drive, Suite 300  
Los Angeles, CA 90094-2536  
Tel: +1 310 301 5800  
EMail: iana@iana.org"

## DESCRIPTION

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## REVISION

"201408120000Z" -- 12 August 2014 00:00:00 GMT

## DESCRIPTION

"Initial version. Published as [RFC 7330](#)."

::= { mib-2 224 }

IANAbfdDiagTC ::= TEXTUAL-CONVENTION

STATUS current

## DESCRIPTION

"A common BFD diagnostic code."

## REFERENCE

"Katz, D. and D. Ward, Bidirectional Forwarding Detection (BFD), [RFC 5880](#), June 2010.

Allan, D., Swallow, G., and Drake, J., Proactive Connectivity Verification, Continuity Check, and Remote Defect Indication for the MPLS Transport Profile, [RFC 6428](#), November 2011."

SYNTAX INTEGER {  
noDiagnostic(0),  
controlDetectionTimeExpired(1),  
echoFunctionFailed(2),

```
neighborSignaledSessionDown(3),
forwardingPlaneReset(4),
pathDown(5),
concatenatedPathDown(6),
administrativelyDown(7),
reverseConcatenatedPathDown(8),
misConnectivityDefect(9)
}

IANAbfdSessTypeTC ::= TEXTUAL-CONVENTION
STATUS          current
DESCRIPTION
    "BFD session type"
REFERENCE
    "Katz, D. and D. Ward, Bidirectional Forwarding
    Detection (BFD), RFC 5880, June 2010.

    Katz, D. and D. Ward, Bidirectional Forwarding
    Detection (BFD) for IPv4 and IPv6 (Single Hop),
    RFC 5881, June 2010.

    Katz, D. and D. Ward, Bidirectional Forwarding
    Detection (BFD) for Multihop Paths, RFC 5883,
    June 2010."
SYNTAX INTEGER {
    singleHop(1),
    multiHopTotallyArbitraryPaths(2),
    multiHopOutOfBandSignaling(3),
    multiHopUnidirectionalLinks(4)
}

IANAbfdSessOperModeTC ::= TEXTUAL-CONVENTION
STATUS          current
DESCRIPTION
    "BFD session operating mode"
REFERENCE
    "Katz, D. and D. Ward, Bidirectional Forwarding
    Detection (BFD), RFC 5880, June 2010."
SYNTAX INTEGER {
    asyncModeWEchoFunction(1),
    asyncModeWOEchoFunction(2),
    demandModeWEchoFunction(3),
    demandModeWOEchoFunction(4)
}

IANAbfdSessStateTC ::= TEXTUAL-CONVENTION
STATUS          current
DESCRIPTION
```

"BFD session state. State failing(5) is only applicable if corresponding session is running in BFD version 0."

## REFERENCE

"Katz, D. and D. Ward, Bidirectional Forwarding Detection (BFD), RFC 5880, June 2010."

```
SYNTAX INTEGER {  
    adminDown(1),  
    down(2),  
    init(3),  
    up(4),  
    failing(5)  
}
```

IANAbfdSessAuthenticationTypeTC ::= TEXTUAL-CONVENTION  
STATUS current

## DESCRIPTION

"BFD authentication type"

## REFERENCE

"Sections 4.2 - 4.4 from Katz, D. and D. Ward, Bidirectional Forwarding Detection (BFD), RFC 5880, June 2010."

```
SYNTAX INTEGER {  
    noAuthentication(-1),  
    reserved(0),  
    simplePassword(1),  
    keyedMD5(2),  
    meticulousKeyedMD5(3),  
    keyedSHA1(4),  
    meticulousKeyedSHA1(5)  
}
```

IANAbfdSessAuthenticationKeyTC ::= TEXTUAL-CONVENTION

DISPLAY-HINT "1x "  
STATUS current

## DESCRIPTION

"BFD authentication key type."

An IANAbfdSessAuthenticationKeyTC is always interpreted within the context of an IANAbfdSessAuthenticationTypeTC value. Every usage of the IANAbfdSessAuthenticationTypeTC textual convention is required to specify the IANAbfdSessAuthenticationKeyTC object that provides the context. It is suggested that the IANAbfdSessAuthenticationKeyTC object be logically registered before the object(s) that use the IANAbfdSessAuthenticationKeyTC textual convention, if they appear in the same logical row.



The value of an IANAbfdSessAuthenticationKeyTC must always be consistent with the value of the associated IANAbfdSessAuthenticationTypeTC object. Attempts to set an IANAbfdSessAuthenticationKeyTC object to a value inconsistent with the associated IANAbfdSessAuthenticationTypeTC must fail with an inconsistentValue error.

The following size constraints for an IANAbfdSessAuthenticationKeyTC object are defined for the associated IANAbfdSessAuthenticationTypeTC values show below:

```
noAuthentication(-1): SIZE(0)
reserved(0): SIZE(0)
simplePassword(1): SIZE(1..16)
keyedMD5(2): SIZE(16)
meticulousKeyedMD5(3): SIZE(16)
keyedSHA1(4): SIZE(20)
meticulousKeyedSHA1(5): SIZE(20)
```

When this textual convention is used as the syntax of an index object, there may be issues with the limit of 128 sub-identifiers specified in SMIV2, STD 58. In this case, the object definition MUST include a 'SIZE' clause to limit the number of potential instance sub-identifiers; otherwise, the applicable constraints MUST be stated in the appropriate conceptual row DESCRIPTION clauses, or in the surrounding documentation if there is no single DESCRIPTION clause that is appropriate."

#### REFERENCE

"Sections 4.2 - 4.4 from Katz, D. and D. Ward, Bidirectional Forwarding Detection (BFD), RFC 5880, June 2010."  
SYNTAX OCTET STRING(SIZE(0..252))

END

## 4. Security Considerations

This module does not define any management objects. Instead, it defines a set of textual conventions which may be used by other BFD MIB modules to define management objects.

Meaningful security considerations can only be written in the MIB modules that define management objects. This document has therefore no impact on the security of the Internet.

## 5. IANA Considerations

This document provides the base definition of the IANA-BFD-TC-STD-MIB module. This MIB module is under the direct control of IANA. See [Section 3](#) for the initial contents. See the most updated version of this MIB at <http://www.iana.org/assignments/ianabfdtcstd-mib>. Assignments of IANA-BFD-TC-STD-MIB are via IETF Review [[RFC5226](#)].

This MIB makes reference to the following documents: [[RFC2578](#)], [[RFC2579](#)], [[RFC5880](#)], [[RFC5881](#)] and [[RFC5883](#)], [[RFC6428](#)], and [[RFC7130](#)].

IANA assigned an OID to the BFD-TC-STD-MIB module specified in this document as { mib-2 223 }.

IANA assigned an OID to the IANA-BFD-TC-STD-MIB module specified in this document as { mib-2 224 }.

## 6. Acknowledgments

The authors would like to thank Adrian Farrel and Jeffrey Haas for performing thorough reviews and providing a number of suggestions. The authors would also like to thank David Ward and Christer Holmberg for their comments and suggestions.

## 7. References

### 7.1. 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.
- [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.
- [RFC6428] Allan, D., Swallow Ed. , G., and J. Drake Ed. , "Proactive Connectivity Verification, Continuity Check, and Remote Defect Indication for the MPLS Transport Profile", [RFC 6428](#), November 2011.
- [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.

## 7.2. 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.
- [RFC5226] Narten, T. and H. Alvestrand, "Guidelines for Writing an IANA Considerations Section in RFCs", [BCP 26](#), [RFC 5226](#), May 2008.

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