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Optimizing BFD Authentication
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Abstract

This document describes an experimental optimization to BFD Authentication. It provides a procedure where BFD significant changes require strong authentication and permits the majority of BFD Control Packets to use a less computationally intensive authentication mechanism. This enables BFD to scale better when there is a desire to use strong authentication.

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Table of Contents

1. Introduction	3
1.1. Requirements Language	3
1.2. Note to RFC Editor	3
2. Terminology	3
3. BFD Control Packets That Require Strong Authentication	4
3.1. Protecting BFD Significant Changes with Strong Authentication	5
4. Using Less Computationally Intensive Auth Types	5
5. Periodic Strong Reauthentication	5
6. Optimized Authentication Modes	6
7. Signaling Optimized Authentication	7
7.1. Transmitting and Receiving Using Optimized Authentication	8
7.2. Optimized Authentication Operations	9
8. Optimizing Authentication YANG Data Model	9
8.1. Data Model Overview	10
8.2. Tree Diagram	10
8.3. The YANG Data Model	10
9. IANA Considerations	14
9.1. IETF XML Registry	14
9.2. The YANG Module Names Registry	15
10. Security Considerations	15
10.1. Protocol Security Considerations	15
10.2. YANG Security Considerations	16
11. Contributors	16
12. Acknowledgments	17
13. References	17
13.1. Normative References	17
13.2. Informative References	18
Appendix A. Examples	19
A.1. Single Hop BFD Configuration	19
Appendix B. Experimental Status	21
Authors' Addresses	22

1. Introduction

Authenticating every BFD [RFC5880] control packet with MD5 Message-Digest Algorithm [RFC1321], or Secure Hash Algorithm (SHA-1) is a computationally intensive process. This makes it difficult, if not impossible, to authenticate every BFD packet at high session scale and at faster rates.

This document describes an experimental procedure whereby only BFD state transitions and some other changes (as described later in this document) require strong authentication. The majority of BFD Control Packets use a less computationally intensive authentication mechanism. The details of the motivation for experimental status are given in Appendix B.

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 [RFC2119] [RFC8174] when, and only when, they appear in all capitals, as shown here.

1.2. Note to RFC Editor

This document uses several placeholder values throughout the document. Please replace them as follows and remove this note before publication.

RFC XXXX, where XXXX is the number assigned to this document at the time of publication.

2025-09-10 with the actual date of the publication of this document.

2. Terminology

The following terms used in this document have been defined in BFD [RFC5880].

- * Auth Type
- * Detect Multiplier
- * Detection Time

The following terms are introduced in this document.

Term	Meaning
significant change	State change, a demand mode change (to D bit) or a poll sequence change (P or F bit). Changes to BFD control packets that do not require a poll sequence, such as bfd.DetectMult are also considered as a significant change.
configured strong reauthentication interval	Interval at which BFD control packets are retried with strong authentication.

Table 1

3. BFD Control Packets That Require Strong Authentication

For purposes of this document, "strong authentication" refers to BFD authentication mechanisms such as those already defined for use with BFD. For example, MD5 and SHA1 (Section 6.7 of [RFC5880]).

The intention of these optimized procedures is to permit strong authentication for BFD state changes and utilize the less computationally intensive authentication mechanisms to provide protection for the session in the Up state while performing less overall work. Such procedures will aid BFD session scaling without compromising BFD session security.

All BFD Control Packets with the state AdminDown, Down, and Init MUST use strong authentication.

Once the BFD state machine has reached the Up state, it will continue to send BFD Control Packets with strong authentication in the Up state for a period as discussed in Section 7.2. If optimized authentication mechanisms are in use, as defined later in this document, the session MAY switch to the less computationally intensive mode.

The contents of an Up packet must not change aside from the Authentication Section unless strong authentication is in use.

In addition to these requirements, BFD "significant changes" require strong authentication.

3.1. Protecting BFD Significant Changes with Strong Authentication

This document proposes that BFD control packets that signal a state change, a change in demand mode (D bit), or a poll sequence (P or F bit change) be categorized as a "significant change". Control packets that do not require a poll sequence, such as `bfd.DetectMult` are also considered as a significant change.

Such significant changes are intended to be protected by strong authentication.

4. Using Less Computationally Intensive Auth Types

The majority of packets exchanged in a BFD session in the Up state are not significant changes. This document proposes a new optimized authentication mode where packets that are not significant changes may use a less computationally intensive authentication mechanism.

Once the session has reached the Up state, the session can use a less computationally intensive Auth Type. Currently, this includes:

- * Meticulous Keyed ISAAC authentication as described in [I-D.ietf-bfd-secure-sequence-numbers]. This authentication type protects the BFD session when BFD Up packets do not change, because only the paired devices know the shared secret, key, and sequence number to select the ISAAC result.

5. Periodic Strong Reauthentication

When using the less computationally intensive authentication mechanism, BFD should periodically test the session using the strong authentication mechanism. Strong authentication is tested using a Poll sequence. To test strong authentication, a Poll sequence SHOULD be initiated by the sender using the strong authentication mode rather than the less computationally intensive mechanism. If a control packet with the Final (F) bit is not received within twice the Detect Interval as would be calculated by the receiving system, the session has been compromised, and MUST be brought down.

The value "twice the Detect interval as would be calculated by the receiving system" is, roughly, twice the number of packets the local system would transmit to the receiving system within its own Detect Interval. This accommodates for possible packet loss from the sending system during the Poll sequence to the receiving system, plus time for the receiving system to transmit control packet with the Final (F) bit set to the local system.

This "strong reauthentication interval" for performing such periodic tests using the strong authentication mechanism can be configured depending on the capability of the system.

Most packets transmitted in a BFD session are BFD Up packets. Strongly authenticating a limited subset of these packets with a Poll sequence as described above, for example every one minute, significantly reduces the computational demand for the system while maintaining security of the session across the configured strong reauthentication interval.

6. Optimized Authentication Modes

The cryptographic authentication mechanisms specified in Section 6.7 of BFD [RFC5880] describe enabling and disabling of authentication as a one time operation. "... implementations using this method SHOULD only allow the authentication state to be changed at most once without some form of intervention (so that authentication cannot be turned on and off repeatedly simply based on the receipt of BFD Control packets from remote systems)." (Section 6.7.1 of [RFC5880]) Once enabled, every packet must have Authentication Bit set and the associated Authentication Type appended (Section 4.1 of [RFC5880]). In addition, it states that an implementation SHOULD NOT allow the authentication state to be changed based on the receipt of a BFD control packet.

This document proposes that an "optimized" authentication mode that permits both a strong authentication mode and a less computationally intensive mode to be used within the same BFD session. This pairing of a strong and an less computationally intensive mode of authentication is carried in new BFD authentication types representing a given optimized authentication type pairing.

This document defines in Section 3.1 which BFD control packets are required to be strongly authenticated. A BFD control packet that fails authentication is discarded, or a BFD control packet that was supposed to be strongly authenticated, but was not; e.g. a significant change packet, is discarded. However, there is no change to the state machine for BFD, as the decision of a significant change is still decided by how many valid consecutive packets were received.

In this specification, the contents of an Up packet MUST NOT change aside from the Authentication Section without strong authentication. The full procedure is documented in the following sections.

7. Signaling Optimized Authentication

When the Authentication Present (A) bit is set and the Auth Type is a type supporting Optimized BFD Authentication, the Auth Type signals a pairing of a strong authentication type and a less computationally intensive authentication type. This pairing is advertised in a single Auth Type value in order to permit implementations to be aware that:

- * Optimized BFD procedures will be in use.
- * The pairing of the strong and less computationally intensive authentication mechanisms will be used for that session.
- * The requirement to carry a Sequence Number.
- * The current strong or less computationally intensive mode will be carried as described below:

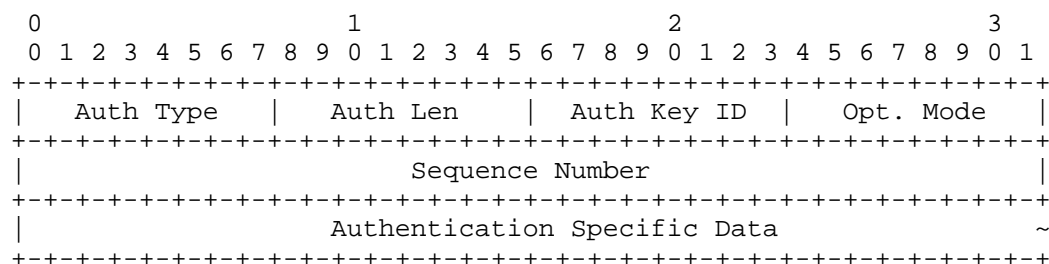


Figure 1: Common BFD Authentication Section

The Meticulous Keyed MD5 (Section 6.7.3 of [RFC5880]), Meticulous Keyed SHA-1 (Section 6.7.4 of [RFC5880]), and Meticulous Keyed ISAAC Authentication (Section 5 of [I-D.ietf-bfd-secure-sequence-numbers]) Sections define the fourth octet as "Reserved". This document repurposes the "Reserved" field as the "Optimized Authentication Mode" field when used for authentication types for optimized BFD procedures.

The values of the Optimized Authentication Mode field are:

1. When using the strong authentication type for optimized BFD Auth Types.
2. When using the less computationally intensive authentication type for optimized BFD Auth Types.

Authentication Specific Data: When using the strong authentication type, the remainder of the Authentication Section carries that type's data.

7.1. Transmitting and Receiving Using Optimized Authentication

The procedures for authenticating BFD Control packets using Optimized Authentication is similar to the existing procedures covered in Section 6.7 of [RFC5880]. Optimized Authentication modes have common procedural requirements for authentication regardless of which strong and less computationally intensive authentication modes are used.

The required value of the Auth Len field for a given Optimized Authentication mode is defined in the respective specifications for the strong mode and less computationally intensive mode.

The following common procedures apply to authenticating BFD Control packets utilizing Optimized Authentication:

If the received BFD Control packet does not contain an Authentication Section ([RFC5880], Section 4.1), or the Auth Type is not a supported Optimized Authentication Auth Type, then the received packet MUST be discarded.

If the received BFD Control packet contains an optimized authentication type using these procedures and the Optimized Authentication Mode field is not 1 or 2, then the received packet MUST be discarded.

If bfd.SessionState is AdminDown, Down, or Init and the Optimized Authentication Mode field is not 1, then the received packet MUST be discarded.

If bfd.SessionState is Up and there is a significant change as defined Section 3.1, and the Optimized Authentication Mode field is not 1, then the received packet MUST be discarded.

If the Auth Len field is not equal to a value appropriate for the Optimized Authentication Mode field, the packet MUST be discarded.

If bfd.AuthSeqKnown is 1, examine the Sequence Number field. If the sequence number lies outside of the range of bfd.RcvAuthSeq+1 to bfd.RcvAuthSeq+(3*Detect Mult) inclusive (when treated as an unsigned 32-bit circular number space) the received packet MUST be discarded.

Otherwise (bfd.AuthSeqKnown is 0), bfd.AuthSeqKnown MUST be set to 1, bfd.RcvAuthSeq MUST be set to the value of the received Sequence Number field, and the received packet MUST be accepted.

For the specified Auth Type and Optimized Authentication Mode, perform the appropriate authentication procedures. If authentication succeeds, the received packet MUST be accepted. Otherwise, the received packet MUST be discarded.

7.2. Optimized Authentication Operations

As noted in Section 3.1, when using optimized BFD procedures, strong authentication is used in the BFD state machine to bring a BFD session to the Up state or to make any change of the BFD parameters as carried in the BFD Control packet when in the Up state.

Once the BFD session has reached the Up state, the BFD Up state MUST be signaled to the remote BFD system using the strong authentication mode for an interval that is at least the Detection Time before switching to the less computationally intensive authentication mode. This is to permit mechanisms such as Meticulous Keyed ISAAC for BFD Authentication [I-D.ietf-bfd-secure-sequence-numbers] to be bootstrapped before switching to the less computationally intensive mode.

It is RECOMMENDED that when using optimized authentication that implementations switch from strong authentication to the less computationally intensive authentication mode after an interval that is at least the Detection Time. In the circumstances where a BFD session successfully reaches the Up state with strong authentication, but there are problems with the optimized authentication, this will permit the remote system to tear down the session as quickly as possible.

BFD sessions using optimized authentication that succeed in reaching the Up state using strong authentication and fail using the optimized authentication SHOULD bring the issue to the attention of the operator. Further, implementations MAY wish to throttle session restarts.

It is further RECOMMENDED that BFD implementations using optimized authentication defer notifying their client that the session has reached the Up state until it has transitioned to using the optimized authentication mode. In the event where optimized authentication is failing in the protocol, this avoids propagating the failed transitions to the optimized mode to their clients.

8. Optimizing Authentication YANG Data Model

8.1. Data Model Overview

The YANG 1.1 [RFC7950] model defined in this document augments the "ietf-bfd" module to add data nodes relevant to the management of the feature defined in this document. In particular, it adds identities for crypto algorithms that are described in this model, and in Meticulous Keyed ISAAC for BFD Authentication [I-D.ietf-bfd-secure-sequence-numbers]. It adds a feature to enable optimized authentication. Finally, it adds an interval value that specifies how often the BFD session should be re-authenticated once it is in the Up state.

8.2. Tree Diagram

The tree diagram for the YANG modules defined in this document use annotations defined in YANG Tree Diagrams. [RFC8340].

module: ietf-bfd-opt-auth

```
augment /rt:routing/rt:control-plane-protocols
  /rt:control-plane-protocol/bfd:bfd/bfd-ip-sh:ip-sh
    /bfd-ip-sh:sessions/bfd-ip-sh:session
      /bfd-ip-sh:authentication:
        +--rw reauth-interval?  uint32
augment /rt:routing/rt:control-plane-protocols
  /rt:control-plane-protocol/bfd:bfd/bfd-ip-mh:ip-mh
    /bfd-ip-mh:session-groups/bfd-ip-mh:session-group
      /bfd-ip-mh:authentication:
        +--rw reauth-interval?  uint32
augment /rt:routing/rt:control-plane-protocols
  /rt:control-plane-protocol/bfd:bfd/bfd-lag:lag
    /bfd-lag:sessions/bfd-lag:session/bfd-lag:authentication:
      +--rw reauth-interval?  uint32
augment /rt:routing/rt:control-plane-protocols
  /rt:control-plane-protocol/bfd:bfd/bfd-mpls:mpls
    /bfd-mpls:session-groups/bfd-mpls:session-group
      /bfd-mpls:authentication:
        +--rw reauth-interval?  uint32
```

8.3. The YANG Data Model

This YANG module imports modules defined in YANG Key Chain [RFC8177], A YANG Data Model for Routing Management (NMDA version) [RFC8349], and YANG Data Model for Bidirectional Forwarding Detection (BFD) [RFC9314].

Implementations supporting the optimization procedures defined in this document enable optimization by using one of the newly defined key-chain crypto-algorithms defined in this YANG module.

```
<CODE BEGINS> file "ietf-bfd-opt-auth@2025-09-10.yang"
module ietf-bfd-opt-auth {
  yang-version 1.1;
  namespace "urn:ietf:params:xml:ns:yang:ietf-bfd-opt-auth";
  prefix "bfd-oa";

  import ietf-routing {
    prefix "rt";
    reference
      "RFC 8349: A YANG Data Model for Routing Management
       (NMDA version)";
  }

  import ietf-bfd {
    prefix bfd;
    reference
      "RFC 9314: YANG Data Model for Bidirectional
       Forwarding Detection (BFD).";
  }

  import ietf-bfd-ip-sh {
    prefix bfd-ip-sh;
    reference
      "RFC 9314: YANG Data Model for Bidirectional
       Forwarding Detection (BFD).";
  }

  import ietf-bfd-ip-mh {
    prefix bfd-ip-mh;
    reference
      "RFC 9314: YANG Data Model for Bidirectional
       Forwarding Detection (BFD).";
  }

  import ietf-bfd-lag {
    prefix bfd-lag;
    reference
      "RFC 9314: YANG Data Model for Bidirectional
       Forwarding Detection (BFD).";
  }

  import ietf-bfd-mpls {
    prefix bfd-mpls;
    reference
```

```
"RFC 9314: YANG Data Model for Bidirectional
Forwarding Detection (BFD).";
}

import ietf-key-chain {
  prefix key-chain;
  reference
    "RFC 8177: YANG Data Model for Key Chains.";
}

organization
  "IETF BFD Working Group";

contact
  "WG Web:    <http://tools.ietf.org/wg/bfd>
  WG List:    <rtg-bfd@ietf.org>

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           Jeffrey Haas (jhaas@juniper.net).";

description
  "This YANG module augments the base BFD YANG model to add
  attributes related to the experimental BFD Optimized
  Authentication.

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  This version of this YANG module is part of RFC XXXX
  (https://www.rfc-editor.org/info/rfcXXXX); see the RFC itself
  for full legal notices.

  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) (RFC 8174) when, and only when,
  they appear in all capitals, as shown here.";
```

```
revision "2025-09-10" {
  description
    "Initial Version.";
  reference
    "RFC XXXX: Optimizing BFD Authentication.";
}

feature optimized-auth {
  description
    "Indicates that the implementation supports optimized
    authentication.";
  reference
    "RFC XXXX: Optimizing BFD Authentication.";
}

grouping bfd-opt-auth-config {
  description
    "Grouping for BFD Optimized Authentication Parameters.";
  leaf reauth-interval {
    type uint32;
    units "seconds";
    default "60";
    description
      "Interval of time after which strong authentication
      should be utilized to prevent an on-path-attacker attack.

      A value of zero means that we do not do periodic
      reauthentication using the strong authentication method.

      This value SHOULD have jitter applied to it to avoid
      self-synchronization during expensive authentication
      operations.";
  }
}

augment "/rt:routing/rt:control-plane-protocols" +
  "/rt:control-plane-protocol/bfd:bfd/bfd-ip-sh:ip-sh" +
  "/bfd-ip-sh:sessions/bfd-ip-sh:session" +
  "/bfd-ip-sh:authentication" {
  uses bfd-opt-auth-config;

  description
    "Augment the 'authentication' container for single hop BFD
    module to add attributes related to BFD optimized
    authentication.";
}

augment "/rt:routing/rt:control-plane-protocols/" +
```

```
        "rt:control-plane-protocol/bfd:bfd/bfd-ip-mh:ip-mh/" +
        "bfd-ip-mh:session-groups/bfd-ip-mh:session-group/" +
        "bfd-ip-mh:authentication" {
uses bfd-opt-auth-config;

description
  "Augment the 'authentication' container for multi-hop BFD
  module to add attributes related to BFD optimized
  authentication.";
}

augment "/rt:routing/rt:control-plane-protocols/" +
        "rt:control-plane-protocol/bfd:bfd/bfd-lag:lag/" +
        "bfd-lag:sessions/bfd-lag:session/" +
        "bfd-lag:authentication" {
uses bfd-opt-auth-config;

description
  "Augment the 'authentication' container for BFD over LAG
  module to add attributes related to BFD optimized
  authentication.";
}

augment "/rt:routing/rt:control-plane-protocols/" +
        "rt:control-plane-protocol/bfd:bfd/bfd-mpls:mpls/" +
        "bfd-mpls:session-groups/bfd-mpls:session-group/" +
        "bfd-mpls:authentication" {
uses bfd-opt-auth-config;

description
  "Augment the 'authentication' container for BFD over MPLS
  module to add attributes related to BFD optimized
  authentication.";
}
}
<CODE ENDS>
```

9. IANA Considerations

This documents requests the assignment of one URI and one YANG model.

9.1. IETF XML Registry

This document registers one URIs in the "ns" subregistry of the "IETF XML" registry [RFC3688]. Following the format in [RFC3688], the following registration is requested:

URI: urn:ietf:params:xml:ns:yang:ietf-bfd-opt-auth
Registrant Contact: The IESG
XML: N/A, the requested URI is an XML namespace.

9.2. The YANG Module Names Registry

This document registers one YANG modules in the "YANG Module Names" registry [RFC6020]. Following the format in [RFC6020], the following registrations are requested:

name: ietf-bfd-opt-auth
namespace: urn:ietf:params:xml:ns:yang:ietf-bfd-opt-auth
prefix: bfd-oa
maintained by IANA: No
reference: RFC XXXX

10. Security Considerations

10.1. Protocol Security Considerations

The approach described in this document enhances the ability to authenticate a BFD session by taking away the onerous requirement that every BFD control packet be strongly authenticated. By strongly authenticating packets that affect the state of the session, the security of the BFD session is maintained. In this mode, packets that are a significant change but are not strongly authenticated, are dropped by the system. Therefore, a malicious user that tries to inject a non-authenticated packet; e.g. with a Down state to take a session down will fail. That combined with the proposal of using sequence number defined in Meticulous Keyed ISAAC for BFD Authentication [I-D.ietf-bfd-secure-sequence-numbers] further enhances the security of BFD sessions.

The recent escalating series of attacks on MD5 and SHA-1 described in Finding Collisions in the Full SHA-1 [SHA-1-attack1] and New Collision Search for SHA-1 [SHA-1-attack2] raise concerns about their remaining useful lifetime as outlined in Updated Security Considerations for the MD5 Message-Digest and the HMAC-MD5 Algorithm [RFC6151] and Security Considerations for the SHA-0 and SHA-1 Message-Digest Algorithm [RFC6194]. If replaced by stronger algorithms the computational overhead will make the task of authenticating every packet even more difficult to achieve.

The procedures described in this document provide a mechanism which could enable implementations to leverage stronger security to address the concerns above when strong authentication is required. However, this requires operators to evaluate the tradeoffs of the less computationally intensive mechanisms adequately address their desired security stance.

10.2. YANG Security Considerations

This section is modeled after the template described in Section 3.7 of [I-D.ietf-netmod-rfc8407bis].

The "ietf-bfd-opt-auth" YANG module defines a data model that is designed to be accessed via YANG-based management protocols, such as NETCONF [RFC6241] or RESTCONF [RFC8040]. These YANG-based management protocols (1) have to use a secure transport layer (e.g., SSH [RFC4252] TLS [RFC8446], and QUIC [RFC9000]) and (2) have to use mutual authentication.

The Network Configuration Access Control Model (NACM) [RFC8341] provides the means to restrict access for particular NETCONF or RESTCONF users to a preconfigured subset of all available NETCONF or RESTCONF protocol operations and content.

There are a number of data nodes defined in this YANG module that are writable/creatable/deletable (i.e., "config true", which is the default). All writable data nodes are likely to be sensitive or vulnerable in some network environments. Write operations (e.g., edit-config) and delete operations to these data nodes without proper protection or authentication can have a negative effect on network operations. The following subtrees and data nodes have particular sensitivities/vulnerabilities:

- * 'reauth-interval' specifies the interval in Up state, after which a strong authentication SHOULD be performed to prevent a Person-In-The-Middle (PITM) attack. If this interval is set very low, the utility of these optimization procedures is lessened. If this interval is set very high, attacks detected by the strong authentication mechanisms may happen overly late.

There are no particularly sensitive readable data nodes.

There are no RPC operations defined in this model.

11. Contributors

The authors of this document would like to acknowledge Reshad Rahman as a contributor to this document.

12. Acknowledgments

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13. References

13.1. Normative References

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Appendix A. Examples

This section tries to show some examples in how the model can be configured.

A.1. Single Hop BFD Configuration

This example demonstrates how a Single Hop BFD session can be configured for optimized authentication.

===== NOTE: '\ ' line wrapping per RFC 8792 =====

```
<?xml version="1.0" encoding="UTF-8"?>
<key-chains
  xmlns="urn:ietf:params:xml:ns:yang:ietf-key-chain">
  <key-chain>
    <name>bfd-auth-config</name>
    <description>"An example for BFD Optimized Auth configuration." \
```

```

</description>
  <key>
    <key-id>55</key-id>
    <lifetime>
      <send-lifetime>
        <start-date-time>2017-01-01T00:00:00Z</start-date-time>
        <end-date-time>2017-02-01T00:00:00Z</end-date-time>
      </send-lifetime>
      <accept-lifetime>
        <start-date-time>2016-12-31T23:59:55Z</start-date-time>
        <end-date-time>2017-02-01T00:00:05Z</end-date-time>
      </accept-lifetime>
    </lifetime>
    <crypto-algorithm xmlns:opt-auth=
      "urn:ietf:params:xml:ns:yang:ietf-bfd-opt-auth">opt-auth:opti\
mized-shal-meticulous-keyed-isaac</crypto-algorithm>
    <key-string>
      <keystring>testvector</keystring>
    </key-string>
  </key>
</key-chain>
</key-chains>
<interfaces
  xmlns="urn:ietf:params:xml:ns:yang:ietf-interfaces"
  xmlns:if-type="urn:ietf:params:xml:ns:yang:iana-if-type">
  <interface>
    <name>eth0</name>
    <type>if-type:ethernetCsmacd</type>
  </interface>
</interfaces>
<routing
  xmlns="urn:ietf:params:xml:ns:yang:ietf-routing"
  xmlns:bfd-types="urn:ietf:params:xml:ns:yang:ietf-bfd-types"
  xmlns:iana-bfd-types="urn:ietf:params:xml:ns:yang:iana-bfd-type\
s"
  xmlns:opt-auth="urn:ietf:params:xml:ns:yang:ietf-bfd-opt-auth">
  <control-plane-protocols>
    <control-plane-protocol>
      <type>bfd-types:bfdv1</type>
      <name>name:BFD</name>
      <bfd xmlns="urn:ietf:params:xml:ns:yang:ietf-bfd">
        <ip-sh xmlns="urn:ietf:params:xml:ns:yang:ietf-bfd-ip-sh">
          <sessions>
            <session>
              <interface>eth0</interface>
              <dest-addr>2001:db8:0:113::101</dest-addr>
              <desired-min-tx-interval>10000</desired-min-tx-interv\
al>

```

```
        <required-min-rx-interval>
            10000
        </required-min-rx-interval>
        <authentication>
            <key-chain>bfd-auth-config</key-chain>
            <opt-auth:reauth-interval>30</opt-auth:reauth-inter\
val>
        </authentication>
    </session>
</sessions>
</ip-sh>
</bfd>
</control-plane-protocol>
</control-plane-protocols>
</routing>
```

Appendix B. Experimental Status

This document describes an experiment that presents a candidate solution to update BFD Authentication that is currently specified in [RFC5880]. This experiment is intended to provide additional insights into what happens when the optimized authentication method defined in this document is used. Here are the reasons why this document is on the Experimental track:

- * In the initial stages of the document, there were significant participation and reviews from the working group. Since then, there has been considerable changes to the document, e.g. the use of ISAAC, allowing for ISAAC bootstrapping when a BFD session comes up and use of a single Auth Type to indicate use of optimized authentication etc. These changes did not get significant review from the working group and therefore does not meet the bar set in Section 4.1.1 of [RFC2026]
- * There are no known implementations (even proof-of-concept) or implementation plans. As a result, we do not currently know if there will be interop issues with legacy implementations or what exactly are the performance benefits of the optimization method.
- * The work in this document could become very valuable in the future, especially if the need for deploying BFD authentication at scale becomes a reality.

This document is classified as Experimental and is not part of the IETF Standards Track. Implementations based on this document should not be considered as compliant with BFD [RFC5880].

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