

Network
Internet-Draft
Updates: [7296](#), 8221, 8247 (if approved)
Intended status: Standards Track
Expires: August 25, 2021

P. Wouters, Ed.
Red Hat
February 21, 2021

**Deprecation of IKEv1 and obsoleted algorithms
draft-pwouters-ikev1-ipsec-graveyard-06**

Abstract

Internet Key Exchange version 1 (IKEv1) is deprecated. Accordingly, IKEv1 has been moved to Historic status. A number of old algorithms that are associated with IKEv1, and not widely implemented for IKEv2 are deprecated as well. IANA is instructed to close all IKEv1 registries.

Status of This Memo

This Internet-Draft is submitted in full conformance with the provisions of [BCP 78](#) and [BCP 79](#).

Internet-Drafts are working documents of the Internet Engineering Task Force (IETF). Note that other groups may also distribute working documents as Internet-Drafts. The list of current Internet-Drafts is at <https://datatracker.ietf.org/drafts/current/>.

Internet-Drafts are draft documents valid for a maximum of six months and may be updated, replaced, or obsoleted by other documents at any time. It is inappropriate to use Internet-Drafts as reference material or to cite them other than as "work in progress."

This Internet-Draft will expire on August 25, 2021.

Copyright Notice

Copyright (c) 2021 IETF Trust and the persons identified as the document authors. All rights reserved.

This document is subject to [BCP 78](#) and the IETF Trust's Legal Provisions Relating to IETF Documents (<https://trustee.ietf.org/license-info>) in effect on the date of publication of this document. Please review these documents carefully, as they describe your rights and restrictions with respect to this document. Code Components extracted from this document must include Simplified BSD License text as described in [Section 4](#).e of

the Trust Legal Provisions and are provided without warranty as described in the Simplified BSD License.

Table of Contents

| | | |
|----------------------|--|-------------------|
| 1. | Introduction | 2 |
| 2. | Requirements Language | 2 |
| 3. | RFC 2409 to Historic | 3 |
| 4. | Deprecating obsolete algorithms | 3 |
| 5. | Security Considerations | 3 |
| 6. | IANA Considerations | 4 |
| 7. | References | 5 |
| 7.1. | Normative References | 5 |
| 7.2. | Informative References | 6 |
| | Author's Address | 6 |

[1.](#) Introduction

IKEv1 [[RFC2409](#)] and its related documents for ISAKMP [[RFC2408](#)] and IPsec DOI [[RFC2407](#)] were obsoleted by IKEv2 [[RFC4306](#)] in December 2005. The latest version of IKEv2 at the time of writing was published in 2014 in [[RFC7296](#)]. The Internet Key Exchange (IKE) version 2 has replaced version 1 over 15 years ago. IKEv2 has now seen wide deployment and provides a full replacement for all IKEv1 functionality. No new modifications or new algorithms have been accepted for IKEv1 for at least a decade. IKEv2 addresses various issues present in IKEv1, such as IKEv1 being vulnerable to amplification attacks. IKEv1 has been moved to Historic status, and this document requests IANA to close all IKEv1 registries.

Algorithm implementation requirements and usage guidelines for IKEv2 [[RFC8247](#)] and ESP/AH [[RFC8223](#)] gives guidance to implementors but limits that guidance to avoid broken or weak algorithms. It does not deprecate algorithms that have aged and are not in use, but leave these algorithms in a state of "MAY be used". This document deprecates those algorithms that are no longer advised but for which there are no known attacks resulting in their earlier deprecation.

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

3. [RFC 2409](#) to Historic

IKEv1 is deprecated. Systems running IKEv1 should be upgraded and reconfigured to run IKEv2. Systems that support IKEv1 but not IKEv2 are most likely also unsuitable candidates for continued operation. Such unsupported systems have a much higher chance of containing an implementation vulnerability that will never be patched. IKEv1 systems can be abused for packet amplification attacks. IKEv1 systems most likely do not support modern algorithms such as AES-GCM or CHACHA20_POLY1305 and quite often only support or have been configured to use the very weak Diffie-Hellman Groups 2 and 5. IKEv1 systems should be upgraded or replaced by IKEv2 systems.

IKEv1 and its way of using Preshared Keys (PSKs) protects against quantum computer based attacks. IKEv2 updated its use of PSK to improve the error reporting, but at the expense of post-quantum security. If post-quantum security is required, these systems should be migrated to use IKEv2 Postquantum Preshared Keys (PPK) [[RFC8784](#)]

Some IKEv1 implementations support Labeled IPsec, a method to negotiate an addition Security Context selector to the SPD, but this method was never standardized in IKEv1. Those IKEv1 systems that require Labeled IPsec should migrate to an IKEv2 system supporting Labeled IPsec as specified in [[draft-ietf-ipsecme-labeled-ipsec](#)].

4. Deprecating obsolete algorithms

This document deprecates the following algorithms:

- o Encryption Algorithms: RC5, IDEA, CAST, Blowfish, and the unspecified 3IDEA, ENCR_DES_IV64 and ENCR_DES_IV32
- o PRF Algorithms: the unspecified PRF_HMAC_TIGER
- o Integrity Algorithms: HMAC-MD5-128
- o Diffie-Hellman groups: none

5. Security Considerations

There are only security benefits by deprecating IKEv1 for IKEv2.

The deprecated algorithms have long been in disuse and are no longer actively deployed or researched. It presents an unknown security risk that is best avoided. Additionally, these algorithms not being supported in implementations simplifies those implementations and reduces the accidental use of these deprecated algorithms through misconfiguration or downgrade attacks.

6. IANA Considerations

This document instructs IANA to mark all IKEv1 registries as DEPRECATED.

Additionally, this document instructs IANA to add an additional Status column to the IKEv2 Transform Type registries and mark the following entries as DEPRECATED:

Transform Type 1 - Encryption Algorithm IDs

| Number | Name | Status |
|--------|---------------|--|
| ----- | ----- | ----- |
| 1 | ENCR_DES_IV64 | DEPRECATED [this document] |
| 2 | ENCR_DES | DEPRECATED [RFC8247] |
| 4 | ENCR_RC5 | DEPRECATED [this document] |
| 5 | ENCR_IDEA | DEPRECATED [this document] |
| 6 | ENCR_CAST | DEPRECATED [this document] |
| 7 | ENCR_BLOWFISH | DEPRECATED [this document] |
| 8 | ENCR_3IDEA | DEPRECATED [this document] |
| 9 | ENCR_DES_IV32 | DEPRECATED [this document] |

Figure 1

Transform Type 2 - Pseudorandom Function Transform IDs

| Number | Name | Status |
|--------|----------------|--|
| ----- | ----- | ----- |
| 1 | PRF_HMAC_MD5 | DEPRECATED [RFC8247] |
| 1 | PRF_HMAC_TIGER | DEPRECATED [this document] |

Figure 2

Transform Type 3 - Integrity Algorithm Transform IDs

| Number | Name | Status |
|--------|--------------------|--|
| ----- | ----- | ----- |
| 1 | AUTH_HMAC_MD5_96 | DEPRECATED [RFC8247] |
| 3 | AUTH_DES_MAC | DEPRECATED [RFC8247] |
| 4 | AUTH_KPDK_MD5 | DEPRECATED [RFC8247] |
| 6 | AUTH_HMAC_MD5_128 | DEPRECATED [this document] |
| 7 | AUTH_HMAC_SHA1_160 | DEPRECATED [this document] |

Figure 3

Transform Type 4 - Diffie Hellman Group Transform IDs

| Number | Name | Status |
|--------|--|--|
| ----- | ----- | ----- |
| 1 | 768-bit MODP Group | DEPRECATED [RFC8247] |
| 22 | 1024-bit MODP Group with 160-bit Prime Order Subgroup | DEPRECATED [RFC8247] |

Figure 4

All entries not mentioned here should receive no value in the new Status field.

This document instructs IANA to close and mark as obsolete the Internet Key Exchange (IKE) Attributes registries as well as the "Magic Numbers" for ISAKMP Protocol registries.

The IESG is requested to designate IKEv1 to Historic.

7. References

7.1. Normative References

- [RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", [BCP 14](#), [RFC 2119](#), DOI 10.17487/RFC2119, March 1997, <<https://www.rfc-editor.org/info/rfc2119>>.
- [RFC2407] Piper, D., "The Internet IP Security Domain of Interpretation for ISAKMP", [RFC 2407](#), DOI 10.17487/RFC2407, November 1998, <<https://www.rfc-editor.org/info/rfc2407>>.
- [RFC2408] Maughan, D., Schertler, M., Schneider, M., and J. Turner, "Internet Security Association and Key Management Protocol (ISAKMP)", [RFC 2408](#), DOI 10.17487/RFC2408, November 1998, <<https://www.rfc-editor.org/info/rfc2408>>.
- [RFC2409] Harkins, D. and D. Carrel, "The Internet Key Exchange (IKE)", [RFC 2409](#), DOI 10.17487/RFC2409, November 1998, <<https://www.rfc-editor.org/info/rfc2409>>.
- [RFC4306] Kaufman, C., Ed., "Internet Key Exchange (IKEv2) Protocol", [RFC 4306](#), DOI 10.17487/RFC4306, December 2005, <<https://www.rfc-editor.org/info/rfc4306>>.

- [RFC7296] Kaufman, C., Hoffman, P., Nir, Y., Eronen, P., and T. Kivinen, "Internet Key Exchange Protocol Version 2 (IKEv2)", STD 79, [RFC 7296](#), DOI 10.17487/RFC7296, October 2014, <<https://www.rfc-editor.org/info/rfc7296>>.
- [RFC8174] Leiba, B., "Ambiguity of Uppercase vs Lowercase in [RFC 2119](#) Key Words", [BCP 14](#), [RFC 8174](#), DOI 10.17487/RFC8174, May 2017, <<https://www.rfc-editor.org/info/rfc8174>>.
- [RFC8223] Esale, S., Torvi, R., Jalil, L., Chunduri, U., and K. Raza, "Application-Aware Targeted LDP", [RFC 8223](#), DOI 10.17487/RFC8223, August 2017, <<https://www.rfc-editor.org/info/rfc8223>>.
- [RFC8247] Nir, Y., Kivinen, T., Wouters, P., and D. Migault, "Algorithm Implementation Requirements and Usage Guidance for the Internet Key Exchange Protocol Version 2 (IKEv2)", [RFC 8247](#), DOI 10.17487/RFC8247, September 2017, <<https://www.rfc-editor.org/info/rfc8247>>.
- [RFC8784] Fluhrer, S., Kampanakis, P., McGrew, D., and V. Smylov, "Mixing Preshared Keys in the Internet Key Exchange Protocol Version 2 (IKEv2) for Post-quantum Security", [RFC 8784](#), DOI 10.17487/RFC8784, June 2020, <<https://www.rfc-editor.org/info/rfc8784>>.

7.2. Informative References

- [[draft-ietf-ipsecme-labeled-ipsec](#)]
Wouters, P. and S. Prasad, "Labeled IPsec Traffic Selector support for IKEv2", [draft-ietf-ipsecme-labeled-ipsec](#) (work in progress), March 2019.

Author's Address

Paul Wouters (editor)
Red Hat

Email: pwouters@redhat.com

