

Network Working Group
Internet-Draft
Intended status: Standards Track
Expires: August 26, 2018

V. Birk
H. Marques
pEp Foundation
B. Hoeneisen
Ucom.ch
Feb 22, 2018

pretty Easy privacy (pEp): Trustwords concept
draft-birk-pep-trustwords-00

Abstract

In public-key cryptography comparing the public keys' fingerprints of the communication partners involved is vital to ensure that there is no man-in-the-middle (MITM) attack on the communication channel. Fingerprints normally consist of a chain of hexadecimal chars. However, comparing hexadecimal strings is often impractical for regular users and prone to misunderstandings.

To mitigate these challenges, this memo proposes the comparison of trustwords as opposed to hexadecimal strings. Trustwords are common words in a natural language (e.g., English) to which the hexadecimal strings are mapped to. This makes the verification process more natural.

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 26, 2018.

Copyright Notice

Copyright (c) 2018 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.	Terms	3
3.	The Concept of Trustword Mapping	3
4.	Example	3
5.	Previous work	3
6.	Number of Trustwords for a language	3
7.	The nature of the words	4
8.	IANA Considerations	4
9.	Security Considerations	4
10.	Acknowledgements	4
11.	References	4
	Authors' Addresses	5

[1.](#) Introduction

In public-key cryptography comparing the public keys' fingerprints of the communication partners involved is vital to ensure that there is no man-in-the-middle (MITM) attack on the communication channel. Fingerprints normally consist of a chain of hexadecimal chars. However, comparing hexadecimal strings is often impractical for regular users and prone to misunderstandings.

To mitigate these challenges, this memo proposes the comparision of trustwords as opposed to hexadecimal strings. Trustwords are common words in a natural language (e.g., English) to which the hexidecimal strings are mapped to. This makes the verification process more natural.

Trustwords are used to achieve easy contact verification in pEp's proposition of Privacy by Default [[pEp](#)] for end-to-end encryption situations after the peers have exchanged public keys opportunistically.

Trustwords may also be used for purposes other than contact verification.

2. Terms

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 [[RFC2119](#)].

3. The Concept of Trustword Mapping

4. Example

A fingerprint typically looks like:

```
F482 E952 2F48 618B 01BC 31DC 5428 D7FA ACDC 3F13
```

Its mapping to trustwords looks like:

```
dog house brother town fat bath school banana kite task
```

[[Actual mapping for English should be used here and perhaps an example for another language.]]

Instead of the former hexadecimal string, users can compare ten common words of their language.

5. Previous work

The basic concept of trustword mapping has been already documented in the past, e.g. for use in One-Time Passwords (OTP) [[RFC2289](#)] or the PGP Word List ("Pretty Good Privacy word list" [[PGPwordlist](#)], also called a biometric word list, to compare fingerprints.

6. Number of Trustwords for a language

Previous proposals have the shortcoming of a limited number of trustwords and they are usually only available in English. If the number of trustwords is low, a lot of trustworks need to be compared, which make a comparison somewhat cumbersome for users, i.e. leads to degraded usability. To reduce the number of trustwords to compare, 16-bit scalars are mapped to natural language words. Therefore, the size (by number of key--value pairs) of any key--value pair structure MUST be 65536, the keys being the enumeration of the Trustwords (starting at 0) and the values being individual natural language words in the respective language.

However, the number of unique values to be used in a language may be less than 65536. This can be addressed e.g. by using the same value (trustword) for more than one key. However, the entropy of the representation is slightly reduced.

Example. A Trustwords list of just 42000 words still allows for an entropy of $\log_2(42000) \approx 15.36$ bits in 16-bit mappings.

It is for further study, what minimal number of words (or entropy) should be required.

7. The nature of the words

Every Trustwords list SHOULD be cleared from swearwords in order to not offend users. This is a task to be carried out by speakers of the respective natural language.

8. IANA Considerations

Each natural language requires a different set of trustwords. To allow implementors for identical trustword lists, a IANA registry is to be established. The IANA registration policy according to [\[RFC8126\]](#) will likely be "Expert Review" and "Specification Required".

An IANA registration will contain:

- o language code according to ISO 639-3
- o version number
- o list of up to 65536 trustwords

The details of the IANA registry and requirements for the expert to assess the specification are for further study.

9. Security Considerations

There are no special security considerations.

10. Acknowledgements

This work was initially created by pEp Foundation, and then reviewed and extended with funding by the Internet Society's Beyond the Net Programme on standardizing pEp. [\[bnet\]](#)

11. References

- [bnet] Simao, I., "Beyond the Net. 12 Innovative Projects Selected for Beyond the Net Funding. Implementing Privacy via Mass Encryption: Standardizing pretty Easy privacy's protocols", Jun 2017, <<https://www.internetsociety.org/blog/2017/06/12-innovative-projects-selected-for-beyond-the-net-funding/>>.
- [pEp] pEp Foundation, "pretty Easy privacy (pEp): Privacy by Default [Internet-Draft]", Jan 2018, <<https://tools.ietf.org/html/draft-birk-pep-01>>.
- [PGPwordlist] Wikipedia, "PGP word list", Nov 2017, <https://en.wikipedia.org/w/index.php?title=PGP_word_list&oldid=749481933>.
- [RFC1760] Haller, N., "The S/KEY One-Time Password System", RFC 1760, DOI 10.17487/RFC1760, February 1995, <<https://www.rfc-editor.org/info/rfc1760>>.
- [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>>.
- [RFC2289] Haller, N., Metz, C., Nesser, P., and M. Straw, "A One-Time Password System", STD 61, RFC 2289, DOI 10.17487/RFC2289, February 1998, <<https://www.rfc-editor.org/info/rfc2289>>.
- [RFC8126] Cotton, M., Leiba, B., and T. Narten, "Guidelines for Writing an IANA Considerations Section in RFCs", BCP 26, RFC 8126, DOI 10.17487/RFC8126, June 2017, <<https://www.rfc-editor.org/info/rfc8126>>.

Authors' Addresses

Volker Birk
pEp Foundation

Email: vb@pep-project.org

Hernani Marques
pEp Foundation

Email: hernani.marques@pep.foundation

Bernie Hoeneisen

Ucom Standards Track Solutions GmbH

Email: bernie@ietf.hoeneisen.ch (bernhard.hoeneisen AT ucom.ch)

URI: <http://www.ucom.ch/>