

Network Working Group  
Internet-Draft  
Intended status: Informational  
Expires: April 14, 2016

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October 12, 2015

Using Curve25519 and Curve448 in PKIX  
draft-josefsson-pkix-newcurves-01

## Abstract

This document specifies "named curve" object identifiers for the Curve25519 and Curve448 curves, for use in various X.509 PKIX structures.

## Status of This Memo

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## 1. Introduction

In [[I-D.irtf-cfrg-curves](#)], the elliptic curves Curve25519 and Curve448 are described. They are designed with performance and security in mind. The curves may be used for Diffie-Hellman and Digital Signature operations.

This RFC define ASN.1 "named curve" object identifiers for Curve25519 and Curve448, for use in the Internet X.509 PKI [[RFC5280](#)].

Rather than defining a new subject public key format for these two curves, this document re-use the existing ECDSA/ECDH public-key contained (described in [section 2.3.5 of \[RFC3279\]](#)) and introduce two new "named curve" OIDs. This approach is the same as for the Brainpool curves [[RFC5639](#)].

## 2. Requirements Terminology

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. Curve25519 and Curve448 Named Curve Identifier

Certificates conforming to [[RFC5280](#)] may convey a public key for any public key algorithm. The certificate indicates the algorithm through an algorithm identifier. This algorithm identifier is an OID and optionally associated parameters. [Section 2.3.5 of \[RFC3279\]](#) describe ECDSA/ECDH public keys, specifying the id-ecPublicKey OID. This OID has the associated EcpkParameters parameters structure, which contains the namedCurve CHOICE. Here we introduce two new OIDs for use in the namedCurve field.

```
id-Curve25519    OBJECT IDENTIFIER ::= { 1.3.6.1.4.1.11591.15.1 }
id-Curve448     OBJECT IDENTIFIER ::= { 1.3.6.1.4.1.11591.15.2 }
id-Curve25519ph OBJECT IDENTIFIER ::= { 1.3.6.1.4.1.11591.15.3 }
id-Curve448ph   OBJECT IDENTIFIER ::= { 1.3.6.1.4.1.11591.15.4 }
```

The OID id-Curve25519 refers to Curve25519. The OID id-Curve448 refers to Curve448. Both curves are described in [[I-D.irtf-cfrg-curves](#)]. The OIDs id-Curve25519ph and id-Curve448ph refers to Curve25519 and Curve448 when used with pre-hashing as Ed25519ph and Ed448ph described in [[I-D.irtf-cfrg-eddsa](#)].

The public key value encoded into the ECPoint value is the raw binary values described in [[I-D.irtf-cfrg-curves](#)].

#### [4.](#) Acknowledgements

Text and/or inspiration were drawn from [[RFC5280](#)], [[RFC3279](#)], [[RFC5480](#)], and [[RFC5639](#)].

Several people suggested the utility of specifying OIDs for encoding Curve25519/Curve448 public keys into PKIX certificates, the editor of this document cannot take credit for this idea.

#### [5.](#) IANA Considerations

None.

#### [6.](#) Security Considerations

The security considerations of [[RFC3279](#)], [[RFC5280](#)], [[RFC5480](#)] and [[I-D.irtf-cfrg-curves](#)] apply accordingly.

#### [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.
- [RFC3279] Bassham, L., Polk, W., and R. Housley, "Algorithms and Identifiers for the Internet X.509 Public Key Infrastructure Certificate and Certificate Revocation List (CRL) Profile", [RFC 3279](#), April 2002.
- [RFC5280] Cooper, D., Santesson, S., Farrell, S., Boeyen, S., Housley, R., and W. Polk, "Internet X.509 Public Key Infrastructure Certificate and Certificate Revocation List (CRL) Profile", [RFC 5280](#), May 2008.
- [RFC5480] Turner, S., Brown, D., Yiu, K., Housley, R., and T. Polk,

"Elliptic Curve Cryptography Subject Public Key Information", [RFC 5480](#), March 2009.

[I-D.irtf-cfrg-curves]

Langley, A. and M. Hamburg, "Elliptic Curves for Security", [draft-irtf-cfrg-curves-10](#) (work in progress), October 2015.

[I-D.irtf-cfrg-eddsa]

Josefsson, S. and I. Liusvaara, "Edwards-curve Digital Signature Algorithm (EdDSA)", [draft-irtf-cfrg-eddsa-00](#) (work in progress), October 2015.

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## [7.2.](#) Informative References

[RFC5639] Lochter, M. and J. Merkle, "Elliptic Curve Cryptography (ECC) Brainpool Standard Curves and Curve Generation", [RFC 5639](#), March 2010.

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