JSON Private Key
draft-jones-jose-json-private-key-00

Abstract

The JSON Private Key specification extends the JSON Web Key (JWK) and JSON Web Algorithms (JWA) specifications to define a JavaScript Object Notation (JSON) representation of private keys.

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Table of Contents

1. Introduction
   1.1. Notational Conventions
2. Terminology
3. JWK Parameters for Private Keys
   3.1. JWK Parameters for Elliptic Curve Private Keys
      3.1.1. “d” (ECC Private Key) Parameter
   3.2. JWK Parameters for RSA Private Keys
      3.2.1. “pri” (Private Exponent) Parameter
4. Example Private Keys
5. IANA Considerations
   5.1. JSON Web Key Parameters Registration
      5.1.1. Registry Contents
6. Security Considerations
7. Normative References
Appendix A. Document History
6. Author’s Address
1. Introduction

The JSON Private Key specification extends the JSON Web Key (JWK) [JWK] and JSON Web Algorithms (JWA) [JWA] specifications to define a JavaScript Object Notation (JSON) [RFC4627] representation of private keys.

1.1. Notational Conventions

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 Key words for use in RFCs to Indicate Requirement Levels [RFC2119].

2. Terminology

This specification uses the same terminology as the JSON Web Key (JWK) [JWK] and JSON Web Algorithms (JWA) [JWA] specifications.

3. JWK Parameters for Private Keys

This section defines additional JSON Web Key parameters that enable JWKs to represent private keys.

3.1. JWK Parameters for Elliptic Curve Private Keys

When the JWK `alg` member value is `EC`, the following member MAY be used to represent an Elliptic Curve private key:

3.1.1. "d" (ECC Private Key) Parameter

The `d` (ECC private key) member contains the Elliptic Curve private key value. It is represented as the base64url encoding of the value's unsigned big endian representation as a byte array. The array representation MUST not be shortened to omit any leading zero bytes. For instance, when representing 521 bit integers, the byte array to be base64url encoded MUST contain 66 bytes, including any leading zero bytes.

3.2. JWK Parameters for RSA Private Keys

When the JWK `alg` member value is `RSA`, the following member MAY be used to represent an RSA private key:

3.2.1. "pri" (Private Exponent) Parameter

The `pri` (private exponent) member contains the private exponent value for the RSA private
key. It is represented as the base64url encoding of the value's unsigned big endian representation as a byte array. The array representation MUST not be shortened to omit any leading zero bytes. For instance, when representing 2048 bit integers, the byte array to be base64url encoded MUST contain 256 bytes, including any leading zero bytes.

4. Example Private Keys

The following example JWK Set contains two keys represented as JWKs containing both public and private key values: one using an Elliptic Curve algorithm and a second one using an RSA algorithm. This example extends the example in Section 3 of [JWK], adding private key values. (Line breaks are for display purposes only.)

```
{
  "keys": [
    {
      "alg": "EC",
      "crv": "P-256",
      "x": "MKBCTNlcKUSDij11ySs3526iDZ8AiTo7Tu6KPAqv7D4",
      "y": "4EtI6SR2YiLUrN5vfVHuhp7x8PxltnWw1lbM4IFyM",
      "d": "876Mb6gfUtJ4HtUnUvYMMyJpr5eUZNP4Bk43bVdJ3eAE",
      "use": "enc",
      "kid": "1"
    },
    {
      "alg": "RSA",
      "mod": "0vx7aogebGcQsuPiLjXZpntN9nndrQmbXEs2aiAFbWhM78LhWx4cbbfAAtVT6zu1RKT7aPFFxuhDR1L6sToc_BJECPebWKRjBZC1FV4n3oknjeMstn64Tz_2w-5j3sGy4Hcc5n9yBXArw1931qt7_RN5w6Cf0h4CyQ5v-65Y6jQR0_FDw2QvzqY368QQMcIaTaSgzs8KZgnYb9c7d0zgdAZHu6qMqVR5hajrn1n91c0pbISD08qNLyrdtk-bFTWAI4vMqFh6eZu0FM41Fd2NcWr3XPkzINHqA_G_xBniIqbw0LsijF44-csFCur-kEqUB8awapj2KqkgDKgw",
      "exp": "AQAB",
      "pri": "X4cTteJY_gn4FYPsXB9rdXix5vwsg1FLN5E3EtA6G6RJoVH-LLKD9M7dx5oo7GURknchnerRweUK7h5fJLM0WfbFKNLWY2vv7B6Nq5xSzuXvXT0_YSpqijwp3RTZlBaCxWp4doKf5Nz09B6y_nHNNkroAItkJ46pRuobsXywbReAdYaMwFs9tv8d_cPYVyi07a3tLMN6T7Nm0oadwemg9v47U1C13sk5Z1g7xojPLu4sbg1U2jx4IBTNbZnbJ5zFHK66jT8bgkqskqGjsDKj19Z4qwjbSnn4j2Wi13RL-Us21GVkY8fkFzmeiz0HbIkz0Y6mq0Ytcq8X4jfc0AC8Q",
      "kid": "2011-04-29"
    }
  ]
}
```

5. IANA Considerations

5.1. JSON Web Key Parameters Registration

This specification registers the parameter names defined in Section 3.1 and Section 3.2 in the IANA JSON Web Key Parameters registry [JWK].

5.1.1. Registry Contents

- Parameter Name: d
  - Change Controller: IETF
  - Specification Document(s): Section 3.1.1 of [[ this document ]]
- Parameter Name: pri
  - Change Controller: IETF
6. Security Considerations

The security considerations for this specification are the same as those for the JSON Web Key (JWK) [JWK] specification and the portion of the JSON Web Algorithms (JWA) [JWA] specification that pertains to key representations.

7. Normative References

[JWK] Jones, M., "JSON Web Key (JWK)," July 2012.

Appendix A. Document History

[[ to be removed by the RFC editor before publication as an RFC ]]

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- Created draft-jones-jose-json-private-key to facilitate discussion of the question from the W3C WebCrypto WG to the IETF JOSE WG of whether JOSE plans to support a format for representing private keys.

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