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JSON Private Key
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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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[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": "MKBCTNIcKUSDii11ySs3526iDZ8AiTo7Tu6KPAqv7D4",  
      "y": "4Etl6SRW2YiLUrN5vfvVHuhp7x8PxltmWWlbbM4IFyM",  
      "d": "870MB6gfuTJ4HtUnUvYMyJpr5eUZNP4Bk43bVdj3eAE",  
      "use": "enc",  
      "kid": "1" },  
    { "alg": "RSA",  
      "n": "n",  
      "e": "e",  
      "d": "d",  
      "p": "p",  
      "q": "q",  
      "u": "u",  
      "use": "sig",  
      "kid": "2" } ] }
```

```

    {"alg": "RSA",
      "mod": "0vx7agoebGcQSuuPiLJXZptN9nndrQmbXEps2aiAFbWhM78LhWx4
cbbfAAAtVT86zwu1RK7aPFFxuhDR1L6tSoc_BJECPEbWKRXjBZCiFV4n3oknjhMst
n64tZ_2W-5JsGY4Hc5n9yBXArwl93lqt7_RN5w6Cf0h4QyQ5v-65YGjQR0_FDW2Q
vzqY368QQMicAtaSqzs8KJZgnYb9c7d0zgdAZHzu6qMQvRL5hajrn1n91Cb0pbIS
D08qNLyrdkt-bFTWhAI4vMQFh6WeZu0fM4lFd2NcRwr3XPksINHaQ-G_xBniIqbw
0Ls1jF44-csFCur-kEgU8awapJzKnqDKgw",
      "exp": "AQAB",
      "pri": "X4cTteJY_gn4FYPsXB8rdXix5vwsg1FLN5E3EaG6RJoVH-HLLKD9
M7dx5oo7GURknchnrRweUkC7hT5fJLM0WbFAKNLWY2vv7B6NqXSzUvxT0_YSfqij
wp3RTzlBaCxWp4doFk5N2o8Gy_nHNKroADIkJ46pRUohsXywbReAdYaMwFs9tv8d
_cPVY3i07a3t8MN6TNwm0dSawm9v47UiCl3Sk5ZiG7xojPLu4sbg1U2jx4IBTNBz
nbJSzFHK66jT8bgkuqsk0GjskDjk19Z4qwjwbsnn4j2WBii3RL-Us2lGVkY8fkFz
me1z0HbIkfz0Y6mqn0Ytqc0X4jfcKoAC8Q",
      "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

- o Parameter Name: "d"
- o Change Controller: IETF
- o Specification Document(s): [Section 3.1.1](#) of [[this document]]
- o Parameter Name: "pri"
- o Change Controller: IETF
- o Specification Document(s): [Section 3.2.1](#) of [[this document]]

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

- [JWA] Jones, M., "JSON Web Algorithms (JWA)", July 2012.
- [JWK] Jones, M., "JSON Web Key (JWK)", July 2012.
- [RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", [BCP 14](#), [RFC 2119](#), March 1997.
- [RFC4627] Crockford, D., "The application/json Media Type for JavaScript Object Notation (JSON)", [RFC 4627](#), July 2006.

Appendix A. Document History

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

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Internet-Draft JWS JSON Serialization (JWS-JS) August 2012

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- o 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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