

# API Design Rules Module: Encryption

Logius Standard

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## Status of This Document

This is a draft that could be altered, removed or replaced by other documents. It is not a recommendation approved by TO.

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## § Conformance

As well as sections marked as non-normative, all authoring guidelines, diagrams, examples, and notes in this specification are non-normative. Everything else in this specification is normative.

The key word *MUST* in this document is to be interpreted as described in [BCP 14 \[RFC2119\]](#) [RFC8174] when, and only when, it appears in all capitals, as shown here.

## Abstract

This document is part of the *Nederlandse API Strategie*.

The Nederlandse API Strategie consists of [a set of distinct documents](#).

| Status           | Description & Link                                             |
|------------------|----------------------------------------------------------------|
| Informative      | <a href="#">Inleiding NL API Strategie</a>                     |
| Informative      | <a href="#">Architectuur NL API Strategie</a>                  |
| Informative      | <a href="#">Gebruikerswensen NL API Strategie</a>              |
| Normative        | <a href="#">API Design Rules (ADR v2.0)</a>                    |
| Normative        | <a href="#">Open API Specification (OAS 3.0)</a>               |
| Normative        | <a href="#">NL GOV OAuth profiel</a>                           |
| Normative        | <a href="#">Digikoppeling REST API koppelvlak specificatie</a> |
| Normative module | <a href="#">GEO module v1.0</a>                                |

Before reading this document it is advised to gain knowledge of the informative documents, in particular the [Architecture](#).

This ADR Module contains the requirements for ADR REST-API encryption based on JWE.

## § 1. Introduction

This module specifies the use of JWE for HTTP payload encryption.

This module is applicable when there is a need for end to end message payload confidentiality between client application and server application. In a complex IT landscape the path between client and server can go over several intermediary components/systems in which case end to end confidentiality can be especially relevant. (In this case TLS is terminated in each step on the path and does not protect the http-message in transport fully end to end). A specific example is when there is confidential data that is processed and routed by an intermediary organization which is not allowed to access the contents of the message.

## § 2. Normative Design Rules

### § 2.1 Summary

Design rules are technical rules, which should be tested automatically.

#### List of technical rules

- [/encryption/jwe](#): Use JSON Web Encryption (JWE)

### § 2.2 Design rules

[/encryption/jwe](#): Use JSON Web Encryption (JWE)

Technical

## Statement

For HTTP payload encryption [\*JSON Web Encryption \(JWE\)\*](#) *MUST* be applied with the following requirements.

- The request is sent to Service Provider with content-type: application/jose+json.
- An encrypted request needs to pass application/jose+json as the value for the Content-Type and Accept headers:

**Content-Type:** application/jose+json

**Accept:** application/jose+json

- When the encrypted request uses an unsupported algorithm, the Service Provider rejects the request with a 400 HTTP response.
- Use for encryption the public key from the X.509 certificate of the other party
- Use the following parameters in the JWE protected header:

```
{
  "alg": "RSA-OAEP",
  "enc": "A256GCM",
  "typ": "JWE"
}
```

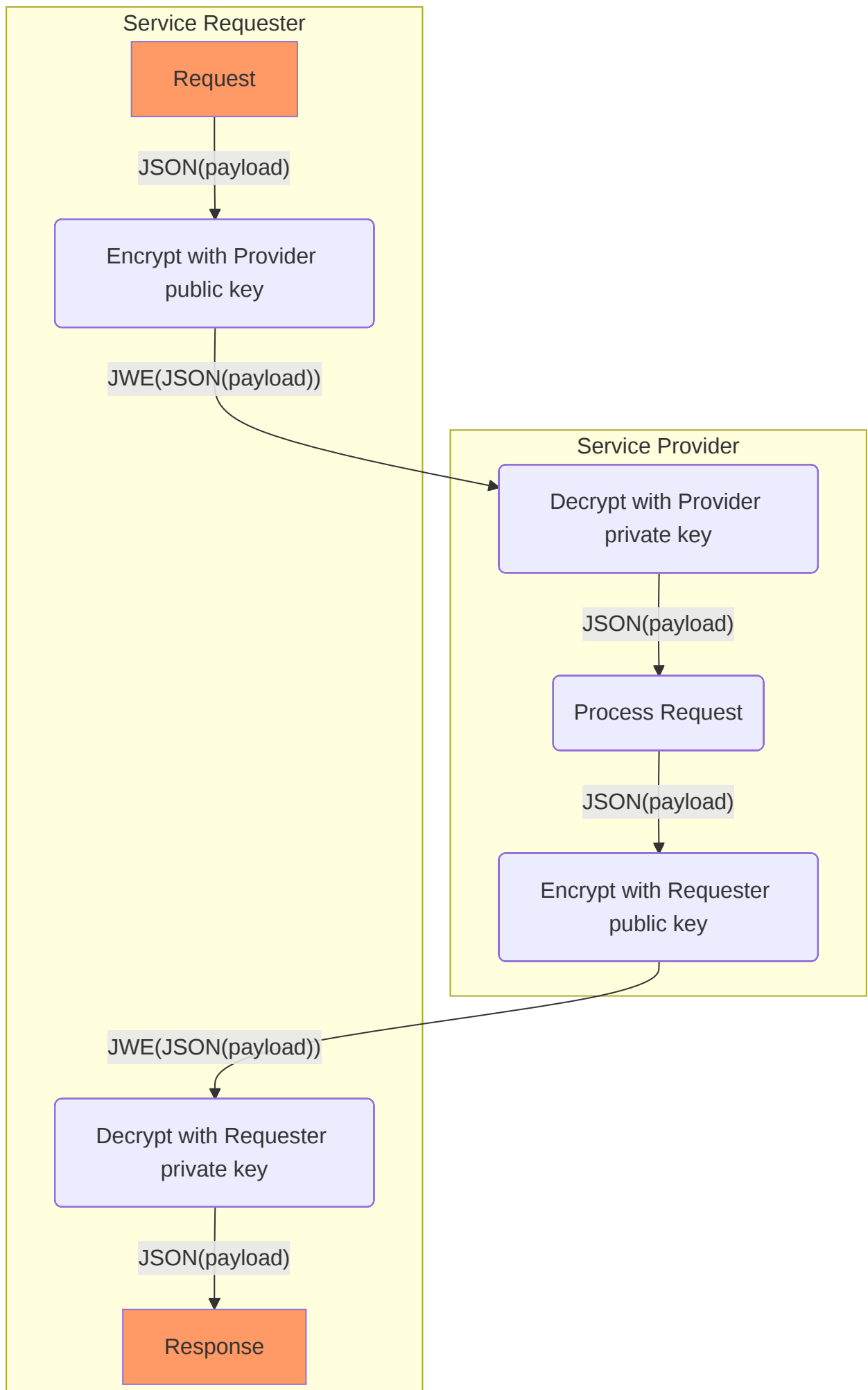
- JWE compact serialization format is used

The following algorithms *MUST* be applied used.

- Key Management: [RSA-OAEP](#)
- Content encryption: [A256GCM](#)

## 2.3 Basic JWE proces flow

The basic flow for encryption using JWE is as follows.



*Figure 1 Encryption*

1. Service Requester encrypts payload using Service Provider public encryption key;
2. Service Provider decrypts the request using the corresponding Service Provider private encryption key.
3. Service Provider performs the request and then generates an encrypted response;
4. Service Requester decrypts response using Requester private key

## § A. Tooling

*This section is non-normative.*

Libraries implementing JWT and the JOSE specs JWS, JWE, JWK, and JWA are listed here.

<https://openid.net/developers/jwt-jws-jwe-jwk-and-jwa-implementations/>

## § B. References

### § B.1 Normative references

#### [RFC2119]

*Key words for use in RFCs to Indicate Requirement Levels*. S. Bradner. IETF. March 1997. Best Current Practice. URL: <https://www.rfc-editor.org/rfc/rfc2119>

#### [rfc7516]

*JSON Web Encryption (JWE)*. M. Jones; J. Hildebrand. IETF. May 2015. Proposed Standard. URL: <https://www.rfc-editor.org/rfc/rfc7516>

#### [RFC8174]

*Ambiguity of Uppercase vs Lowercase in RFC 2119 Key Words*. B. Leiba. IETF. May 2017. Best Current Practice. URL: <https://www.rfc-editor.org/rfc/rfc8174>