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# RPKI signed object for TAL
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Abstract

Trust Anchor Locators (TALs) [RFC7730] are used by Relying Parties in the RPKI to locate and validate Trust Anchor certificates used in RPKI validation. This document defines an RPKI signed object [RFC6488] for a Trust Anchor Locator (TAL) that can be published by Trust Anchor to communicate a new TAL to already deployed Relying Parties. The two primary use cases for this are that 1) a Trust Anchor may wish to change the locations where its TA certificate may be found, and 2) a Trust Anchor may wish to perform a planned migration to a new key. Note that unplanned key rolls are considered out of scope for this document.

Status of This Memo

This Internet-Draft is submitted in full conformance with the provisions of BCP 78 and BCP 79.

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## 1. Requirements notation

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].

## 2. Introduction

Trust Anchor Locator (TAL) files [RFC7730] are used in the Resource Public Key Infrastructure (RPKI) to help Relying Parties locate and verify a trust anchor certificate. A TAL file consists of:

- One or more rsync URIs [RFC5781]
- A subjectPublicKeyInfo [RFC5280] in DER format [X.509], encoded in Base64

The TAL can be distributed out-of-band to Relying Parties (RP), and it allows the RP to retrieve the most recent version of the Trust Anchor (TA) certificate from the cited location, and verify that public key of this certificate matches the TAL. This is useful as it allows selected data in the trust anchor to change, without needing to effect redistribution of the trust anchor per se. In particular the Internet Number Resources (INRs) extension [RFC3779] and the publication points defined in the Subject Information Access [RFC6487] may be updated this way.

The assumption is that both the URIs and key of the TA certificate remain stable. However, an organisation operating a TA may wish to change either of these properties, because of a need to:

- change one or more URIs
- perform a planned key roll

In this document we describe a method for TA operators to publish a an updated TAL in a secure a well-defined fashion, so that RPs can be alerted about these changes.

Note that [RFC5011] describes Automated Updates of DNS Security (DNSSEC) Trust Anchors and can provide some useful insight here as well. However, concepts like a set of Trust Anchors, standby Trust Anchors, and TTLs are not applicable to the RPKI. Therefore we believe that an alternative approach based on already existing concept of the Trust Anchor Locator [RFC7730] is appropriate.

## 3. Signed TAL definition

A signed TAL is an RPKI signed object, as specified in [RFC6488]. The RPKI signed object template requires specification of the following data elements in the context of the manifest structure.

### 3.1. The Signed TAL Content Type

This document requests an OID for signed-Tal as follows:

```
signed-Tal OBJECT IDENTIFIER ::= { iso(1) member-body(2) us(840)
           rsadsi(113549) pkcs(1) pkcs9(9) 16 id-smime (1) TBD }
```

This OID MUST appear both within the eContentType in the encapContentInfo object as well as the content-type signed attribute in the signerInfo object (see [RFC6488]).

### 3.2. The Signed TAL eContent

The content of a Signed TAL is ASN.1 encoded using the Distinguished Encoding Rules (DER) [X.690], and is defined as follows:

```
SignedTalContent ::= IA5String
```

The "SignedTalContent" contains the content of the new TAL encoded in Base64 [RFC4648].

### 3.3. Signed TAL Validation

Before a Relying Party can use a Signed TAL, the relying party MUST first validate the Signed TAL. To validate a Signed TAL, the relying party MUST perform all the validation checks specified in [RFC6488] as well as the following additional specific validation step.

- The eContentType in the EncapsulatedContentInfo has OID 1.2.840.113549.1.9.16.1.TBD.
- The EE certificate of this Signed TAL is signed by a known Trust Anchor
- The decoded TAL content conforms to the format defined in [RFC7730]

If the above procedure indicates that the manifest is invalid, then the Signed TAL MUST be discarded and treated as though no Signed TAL were present.

## 4. Signed TAL Generation

A TA MAY choose to generate a single Singed TAL object to publish in its TA certificate publication point(s) in the RPKI. The TA MUST perform the following steps to generate the Signed TAL:

- Generate a key pair for a "one-time-use" EE certificate to use for the Signed TAL
- Generate a one-time-use EE certificate for the Signed TAL
- This EE certificate MUST have an SIA extension access description field with an accessMethod OID value of id-ad-signedobject, where the associated accessLocation references the publication point of the Sigend TAL as an object URL.
- As described in [RFC6487], an [RFC3779] extension is required in the EE certificate used for this object. However, because the resource set is irrelevant to this object type, this certificate MUST describe its Internet Number Resources (INRs) using the "inherit" attribute, rather than explicit description of a resource set.
- This EE certificate MUST have a "notBefore" time that is before the moment that the Signed TAL will be published.
- This EE certificate MUST have a "notAfter" time that reflects the intended time that this Signed TAL will be published. If the EE certificate for a Signed TAL is expired, it MUST no longer be publish, but of course it MAY be replaced by a newly generated Signed TAL object with similar content and an updated "notAfter" time.

## 5. Signed TAL Publication

A TA MAY publish a single Signed TAL object directly under its CA repository publication points. A non-normative guideline for naming this object is that the filename chosen for the signed TAL in the publication repository be a value derived from the public key part of the entity's key pair, using the algorithm described for CRLs in section 2.2 of [RFC6481] for generation of filenames. The filename extension of ".tal" MUST be used to denote the object as a signed TAL. Note that this is in-line with filename extensions defined in section 7.2 of [RFC6481].

## 6. Supporting a TA Key Roll

A Signed TAL MAY be used to communicate a planned key roll for the TA.

### 6.1. Preparing a new TA key

Prior to publishing the Signed TAL for the new key the TA MUST perform the following steps:

- Generate a new key pair for the new TA certificate
- Generate a new TA Certificate, using a Subject Information Access for CA certificates (see section 4.8.8.1 of [RFC6487]) that references the URIs that will be used by the new key to publish objects, that are different from the URIs used by the TA certificate for the current key.
- ALL current signed certificates and other objects, with the exception of the old CRL, Manifest and Signed TAL, must be re-issued by the new key and published under the new publication point(s).
- The new TA certificate itself MUST be published in a (number of) new location(s) that are different from where the TA certificate for the current key is published.

After these steps are performed a new Signed TAL MUST be generated as described in Section 4, and published as described in Section 5.

### 6.2. Staging period - Using both the old and the new TA key

The staging period is initiated by the initial publication of a Signed TAL for the new key and must be last at least 24 HOURS. During the staging period the TA MUST continue to operate both the old and the new TA key. Note that this is the same staging period used for key roll of normal CAs in the RPKI, described in [RFC6489].

### 6.3. Preserving the Signed TAL

The TA SHOULD preserve a Signed TAL for the old key after the staging period as a hint for RPs that missed the key roll. The following process can be used to achieve this:

- Produce a new long-lived CRL that revokes all previously signed certificates
- Produce a new long-lived Signed TAL
- Produce a new long-lived manifest that includes the CRL and Signed TAL
- Publish the CRL, MFT and Signed TAL

- Destroy the old TA key

### 6.4. Retiring the old key

The TA SHOULD retire and delete its old key after the staging period is over.

### 6.5. Relying Party Use

When an RP discovers a valid Signed TAL signed under a TA, and it notices that the contained TAL is different from its current TAL for this TA and that the "subjectPublicKeyInfo" has changed, then the RP MUST replace the TAL for this TA with the new TAL, abort the current top-down validation operation, and initiate a new top-down validation operation using the updated TAL.

It is RECOMMENDED that the software informs the operator of this event.

## 7. Supporting changing TA certificate publication point(s)

A signed TAL MAY be used to communicate an addition or removal of one or more publication locations where the TA certificate can be found.

### 7.1. Adding a publication point

When adding a publication point for a TA certificate, the TA MUST publish the certificate in the new location(s) prior to publication of the Signed TAL.

### 7.2. Withdrawing a publication point

When removing a publication point for TA certificate, the TA SHOULD observe a staging period of at least 24 Hours. The staging period is initiated by the publication of an updated Signed TAL where the publication point has been removed. During the staging period the TA SHOULD keep the old publication point up to date and available.

### 7.3. Publishing the Signed TAL

It is RECOMMENDED that a Trust Anchor publishes a valid Signed TAL for what it believes its current TAL should be at all times.

### 7.4. Relying Party Use

When an RP discovers a valid Signed TAL signed under a TA, and it notices that the contained TAL is different from its current TAL for this TA and that the "subjectPublicKeyInfo" has not changed, then the

RP MUST replace the TAL for this TA with the new TAL for future use, but can continue the current top-down validation operation.

It is RECOMMENDED that the software informs the operator of this event.

## 8. IANA Considerations

### 8.1. OID

IANA is to add the following to the "RPKI Signed Objects" registry:

| Decimal | Description | References |
|---|---|---|
| TBD | signed-Tal | [section 3.1] |

### 8.2. File Extension

IANA is to add an item for the Signed TAL file extension to the "RPKI Repository Name Scheme" created by [RFC6481] as follows:

| Extension | RPKI Object | Reference |
|---|---|---|
| .tal | Signed TAL | [this document] |

## 9. Security Considerations

TBD

## 10. Acknowledgements

TBD

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