ACME Identifiers and Challenges for VoIP Service Providers
draft-barnes-acme-service-provider-code-00

Abstract

This document describes the use of the Entity Code Identifier and token challenge type to enable the Automated Certificate Management Environment (ACME) to issue certificates for VoIP service providers to support Secure Telephony Identity (STI).

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1. Introduction

[I-D.ietf-acme-acme] is a mechanism for automating certificate management on the Internet. It enables administrative entities to prove effective control over resources like domain names, and automates the process of generating and issuing certificates. [I-D.barnes-acme-token-challenge] defines a new Identifier type (Entity Code) and new challenge type based on a token (Entity Code Token) for authorizing entities to request certificates. The model includes an administrative authority that allocates the entity codes and creates the service provider code tokens for the entities.

This specification defines the use of the Entity Code Identifier and Entity Code Token to enable certification authorities to issue certificates based on service provider codes and related tokens.

2. Overview

The document [ATIS-1000080] provides a framework and model for using certificates based on service provider codes. In this model, each service provider requires only a few certificates, which are used in conjunction with a PASSporT that contains additional information attesting to a service provider's knowledge of the originator of the call. Further details on the PASSporT extensions for this model are provided in the SHAKEN Framework [ATIS-1000074].

In the SHAKEN Certificate Management framework [ATIS-1000080], there is an administrative entity that is responsible for allocating service provider codes. This is referred to as the STI Policy Administrator (STI-PA). This allows a certification authority to validate that the entity requesting issuance of a certificate is authorized to request certificates on behalf of the entity that has been assigned a specific service provider code. A single VoIP service provider can be allocated multiple service provider codes. A service provider can choose to use the same certificate for multiple service providers as reflected by the structure of the TN Authorization List certificate extension defined in [I-D.ietf-stir-certificates].
The intent of the challenges in this document is not to establish that an entity is a valid service provider but rather to provide evidence that an established administrative authority entity has authorized the entity to provide VoIP services in the network and thus to request credentials on behalf of the VoIP users in the network.

3. Using Service Provider Codes for Token Authorization

In order to issue certificates for service providers based on service provider code values, the Entity Code ACME identifier type is used in the ACME authorization objects. The value is set to the value of the service provider code. The ACME challenge type of "ec-token-01" is used to support the authorization of service provider code tokens.

The following is the response that the ACME client receives when it sends a GET for the challenges in the case of a "EntityCode" identifier:

HTTP/1.1 200 OK
Content-Type: application/json
Link: <https://example.com/acme/some-directory>;rel="directory"

{
  "status": "pending",

  "identifier": {
    "type": "EntityCode",
    "value": ["1234-0111"]
  },

  "challenges": [
  {
    "type": "ec-token-01",
    "url": "https://sti-ca.com/authz/asdf/0"
    "token": "DGyRejmCefe7v4NfDGDkF" 
  }
  ]
}

A client responds to this challenge by using the service provider code token for the "ec-token" value. In the SHAKEN Certificate Management framework, the Service Provider has a secure exchange with the STI-PA to obtain a service provider code token that can be used for authorization by the CA when requesting a certificate. The service provider code token is a standard JWT token [RFC7519] using a JWS defined signature string [RFC7515]. It is RECOMMENDED that the lifetime of the service provider code token be greater than the certificate lifetime, in particular in cases where multiple
certificates are being issued using the same service provider code
token.

The entity code token JWT Protected Header to support service
provider code tokens MUST include the following:

```plaintext
alg: Defines the algorithm used in the signature of the token. 
    For Service Provider Code tokens, the algorithm MUST be 
    "ES256".

typ: Set to standard "JWT" value.

x5u: Defines the URL of the certificate of the STI-PA validating 
the Service Provider Code.
```

The service provider code token JWT Payload MUST include the 
following:

```plaintext
sub: Service Provider Code value being validated in the form of 
an ASCII string.

iat: DateTime value of the time and date the token was issued.

nbf: DateTime value of the starting time and date that the token 
is valid.

exp: DateTime value of the ending time and date that the token 
expires.

fingerprint: : Fingerprint of the ACME credentials the Service 
Provider used to create an account with the CA. The 
fingerprint is of the form:
    base64url(JWK_Thumbprint(accountKey)).
```

The "JWK_Thumbprint" step indicates the computation specified 
in [RFC7638], using the SHA-256 digest [FIPS180-4]. As noted 
in JWA [RFC7518] any prepended zero octets in the JWK object 
MUST be stripped before doing the computation.

To respond to a service provider code token challenge, the ACME 
client constructs an entity code authorization ("ec-authz") using the 
"token" value provided in the challenge and the service provider code 
token, that has been previously obtained from the STI-PA, as the 
"ecAuthzToken" value.
An example of the use of the "ec-token-01" in a challenge response sent by the ACME client is provided below:

```
POST /acme/authz/asdf/0 HTTP/1.1
Host: sti-ca.com
Content-Type: application/jose+json

{
  "protected": base64url({
    "alg": "ES256",
    "kid": "https://sti-ca.com/acme/reg/asdf",
    "nonce": "Q_s3MWoqT05TrdkM2MTDcw",
    "url": "https://sti-ca.com/acme/authz/asdf/0"
  }),
  "payload": base64url({
    "ecAuthorization": "D GyRejmCefe7v4N...vb29HhjjLPSggwiE"
  }),
  "signature": "9cbg5J01Gf5YLjz...SpkUfcdPai9uVYYQ"
}
```

Upon receiving a response to the challenge, the ACME server determines the validity of the response as described in [I-D.barnes-acme-token-challenge].

4. **IANA Considerations**

This document requires no IANA registrations.

5. **Security Considerations**

This document relies on the security considerations established for the ACME protocol per [I-D.ietf-acme-acme]. The service provider code token is initially obtained through a secure exchange between the service provider and the entity in the network that is responsible for determining what entities can operate as VoIP service providers (the STI Policy Administrator). Further details on this are provided in [ATIS-1000080].

6. **Informative References**

[ATIS-1000074]

[ATIS-1000080]

[FIPS180-4]

[I-D.ietf-acme-acme]

[I-D.ietf-acme-telephone]

[I-D.ietf-stir-certificates]

[I-D.ietf-stir-passport]

[I-D.ietf-stir-rfc4474bis]

[RFC7340]

[RFC7515]

[RFC7518]
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