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PASSporT Extension for Resource-Priority Authorization
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Abstract

This document extends the PASSporT object to convey cryptographically-signed assertions of authorization for communications 'Resource-Priority'. It extends PASSporT to allow cryptographic-signing of the SIP 'Resource-Priority' header field which is used for communications resource prioritization. It also describes how the PASSporT extension is used in SIP signaling to convey assertions of authorization of the information in the SIP 'Resource-Priority' header field.

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1. Introduction

PASSporT [[I-D.ietf-stir-passport](#)] is a token format based on JWT [[RFC7519](#)] for conveying cryptographically-signed information about the identities involved in personal communications; it is used with STIR [[I-D.ietf-stir-rfc4474bis](#)] to convey a signed assertion of the identity of the participants in real-time communications established via a protocol like SIP. This specification extends PASSporT to allow cryptographic-signing of the SIP 'Resource-Priority' header field defined in [[RFC4412](#)].

[[RFC4412](#)] defines the SIP 'Resource-Priority' header field for communications Resource Priority. As specified in [[RFC4412](#)], the 'Resource-Priority' header field may be used by SIP user agents, including, Public Switched Telephone Network (PSTN) gateways and terminals, and SIP proxy servers to influence prioritization afforded to communication sessions, including PSTN calls. However, the SIP

'Resource-Priority' header field could be spoofed and abused by unauthorized entities.

The STIR architecture assumes that an authority on the originating side of a call provides a cryptographic assurance of the validity of the calling party number in order to prevent impersonation attacks. The STIR architecture allows extension that can be utilized by authorities supporting real-time communication services using the 'Resource-Priority' header field to cryptographically sign the SIP 'Resource-Priority' header field and convey assertion of the authorization for 'Resource-Priority'. For example, the authority on the originating side verifying the authorization of a particular communication for Resource-Priority can use a PASSporT claim to cryptographically-sign the SIP 'Resource-Priority' header field and convey an assertion of the authorization for 'Resource-Priority'. This will allow a receiving entity (including entities located in different network domains/boundaries) to verify the validity of assertions authorizing Resource-Priority. Cryptographically-signed SIP 'Resource-Priority' headers will allow a receiving entity to verify and act on the information with confidence that the information have not been spoofed or compromised.

This specification documents an optional extension to PASSporT and the associated STIR mechanisms to provide a function to sign the SIP 'Resource-Priority' header field. How the optional extension to PASSporT is used for real-time communications supported using SIP 'Resource-Priority' header field is defined in other documents and is outside the scope of this document.

2. Terminology

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 [RFC 2119](#) [RFC2119].

3. PASSporT 'rph' Claim

This specification defines a new JSON Web Token claim for "rph", which provides an assertion for information in SIP 'Resource-Priority' header.

The creator of a PASSporT object adds a "ppt" value of "rph" to the header of a PASSporT object, in which case the PASSporT claims MUST contain a "rph" claim, and any entities verifying the PASSporT object will be required to understand the "ppt" extension in order to process the PASSporT in question. A PASSporT header with the "ppt" included will look as follows:

```
{  "typ": "passport",
  "ppt": "rph",
  "alg": "ES256",
  "x5u": "https://www.example.org/cert.cer"}
```

The "rph" claim will provide an assertion of authorization, "auth", for information in the SIP "Resource-Priority" header field (i.e., Resource-Priority: namespace "." r-priority) based on [RFC4412]. The value of the "rph" claim is an array containing one or more of JSON objects for the content of the SIP 'Resource-Priority' header that is being asserted of which one of the "rph" object, is mandatory.

The following is an example "rph" claim for a SIP "Resource-Priority" header field with a "namespace "." r-priority" value of "ets.0".

```
{  "orig": {"tn": "12155551212"},
  "dest": {"tn": "12125551213"},
  "iat": 1443208345,
  "rph": {"auth": ": "Resource-Priority: ets.0"}}
```

After the header and claims PASSporT objects have been constructed, their signature is generated normally per the guidance in [I-D.ietf-stir-passport] using the full form of PASSporT. The credentials (e.g., authority responsible for authorizing Resource-Priority) used to create the signature must have authority over the "rph" claim.

4. 'rph' in SIP

This section specifies SIP-specific usage for the "rph" claim in PASSporT.

4.1. Authentication Service Behavior

The Authentication Service will create the "rph" claim using the values discussed in section 3 based on [RFC4412]. The construction of "rph" claim follows the steps described in Section 4 of [I-D.ietf-stir-rfc4474bis].

The resulting Identity header for "rph" might look as follows:

```
"eyJhbGciOiJFUzI1NiIsInR5cCI6IkpXVCJ9.eyJpc3MiOiJleUowZVhBaU9pSndZWE56Y0c5eWRDSXNEUW9pY0hCMElqb2ljbkJvSW13TkNpSmhir2NpT2lKRlV6STFOaUlzRFFvaWVEVjFJanBvZEhSd2N6b3ZMM2QzZHk1bGVHRnRjR3hsTG1OdMjTOWpaWEowTG1ObGNuME5DZz09LmV5SnZjbWxuSWpwN0luUnVJam9pTVRJeE5UVTFOVEV5TVRJaWZTd2dEUW9pYVdGMElqb2lNVFEwTXpJd09ETTBOU0lzSUEwS0ltUmxjM1FpT25zaWRHNG1PaU14TWpFMU5UVTFNVEl4TXlKOURRb2ljbkJvSWpwN0ltRjFkR2dpT2lKU1pYTnZkWEpqcWlMxUWntbHZjbWwwZVRvZ1pYUnpMakFpWFgxOURRb05DZzBLIiwibmJmIjoxNDk2NzU4Mzk0LCJleHAiOjE0OTY3NjE5OTQsImhhdCI6MTQ5Njc1ODM5NH0.0-oNMVgchpbiDzSxcktUIQVbkJWL48DfxOTllSHBmj3sZtV2S3SKZkmmU2V9akv2LnJ50JK9W_1ynz7JrChJ3g";info= "https://www.example.org/cert.cer";alg=ES256;ppt="rph"
```

A SIP authentication service typically will derive the value of "rph" from the 'Resource-Priority' header field based on policy associated with service specific use of the "namespace "." r-priority" values based on [RFC4412]. The authentication service derives the value of the PASSporT claim by verifying the authorization for Resource-Priority (i.e., verifying a calling user privilege for Resource-Priority based on its identity) which might be derived from customer profile data or from access to external services.

[RFC4412] allows multiple "namespace "." r-priority" pairs, either in a single SIP Resource-Priority header or across multiple SIP Resource-Priority headers. However, it is not necessary to sign all content of a SIP Resource-Priority header or all SIP Resource-Priority headers in a given SIP message. An authority is only responsible for signing the content of a SIP Resource-Priority header for which it has authority (e.g., a specific "namespace "." r-priority").

4.2. Verification Service Behavior

[I-D.ietf-stir-rfc4474bis] [Section 6.2](#) Step 5 requires that specifications defining "ppt" values describe any additional verifier behavior. The behavior specified for the "ppt" values of "rph" is as follows:

The verification service MUST extract the value associated with the "auth" key in a full form PASSporT with a "ppt" value of "rph". If the signature validates, then the verification service can use the value of the "rph" claim as validation that the calling party is authorized for Resource-Priority, which would in turn be used for priority treatment in accordance with local policy for the associated communication service.

The verification service MUST extract the value associated with the "auth" key in a full form PASSporT with a "ppt" value of "rph". If the signature validates, then the verification service can use the value of the "rph" claim as validation that the calling party is authorized for Resource-Priority, which would in turn be used for

priority treatment in accordance with local policy for the associated communication service.

In addition, [[I-D.ietf-stir-rfc4474bis](#)] [Section 6.2](#) Step 4 requires "iat" value in "rph" claim to be verified.

The behavior of a SIP UAs upon receiving an INVITE containing a PASSporT object with a "rph" claim will largely remain a matter of implementation policy for the specific communication service. In most cases, implementations would act based on confidence in the veracity of this information.

5. Further Information Associated with Resource-Priority

There may be additional information about the calling party or the call that could be relevant to authorization for Resource-Priority. This may include information related to the device subscription of the caller, or to any institutions that the caller or device is associated with, or even categories of institutions. All of these data elements would benefit from the secure attestations provided by the STIR and PASSporT frameworks. The specification of the "rph" claim could entail the optional presence of one or more such additional information fields.

A new IANA registry has been defined to hold potential values of the "rph" array; see [Section 8.3](#). Details of extensions to the "rph" claim to encompass other data elements are left for future version of this specification.

6. IANA Considerations

6.1. JSON Web Token Claims Registration

- o Claim Name: "rph"
- o Claim Description: Resource Priority Header
- o Change Controller: IESG
- o Specification Document(s): [Section 3](#) of [[RFCThis](#)]

6.2. PASSporT RPH Types

This document requests that the IANA create a new registry for PASSporT RPH types. Registration of new PASSporT RPH types shall be under the specification required policy.

This registry is to be initially populated with a single value for "namespace" which is specified in [RFCThis].

7. Security Considerations

The security considerations discussed in [I-D.ietf-stir-rfc4474bis] in [Section 10](#) are applicable here.

7.1. Avoidance of replay and cut and past attacks

The PASSporT extension with a "ppt" value of "rph" MUST only be sent with SIP when 'Resource-Priority' header is used to convey the priority of the communication as defined in [RFC4412]. A uniqueness of the set of token with extension claims and token signature is constructed using the originating identity being asserted with the "orig" claim along with the following two claims:

- o "iat" claim should correspond to a date/time the message was originated. It should also be within a relative time that is reasonable for clock drift and transmission time characteristics associated with the application using the PASSporT token. Therefore, validation of the token should consider date and time correlation, which could be influenced by signaling protocol specific use and network time differences.
- o "dest" claim is included to prevent the valid re-use of a previously originated message to send to another destination party.

7.2. Solution Considerations

The use of extension to PASSporT tokens with ppt value rph based on the validation of the digital signature and the associated certificate requires consideration of the authentication and authority or reputation of the signer to attest to the identity being asserted. The following considerations should be recognized when using PASSporT extension with "ppt" value of "rph":

- o The use of this token should not, in it's own right, be considered a full solution for absolute non-repudiation of the identity being asserted.
- o An authority (signer) is only allowed to sign the content of a SIP 'Resource-Priority' header for which it has the right authority. The authority that signs the token MUST have a secure method for authentication of the end user or the device.

- o The verification of the signature MUST include means of verifying that the signer is authoritative for the signed content of the SIP 'Resource-Priority' header.

7.3. Acknowledgements

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8. References

8.1. Normative References

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