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R. Singh
Vencore Labs
M. Dolly
AT&T
S. Das
Vencore Labs
A. Nguyen
Office of Emergency Communication/DHS
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PASSporT Extension for Resource-Priority Authorization
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Abstract

This document extends the Secure Telephone Identity Revisited (STIR) Personal Assertion Token (PASSporT) specification defined in [I-D.ietf-stir-passport] to allow the inclusion of cryptographically signed assertions of authorization for the values populated in the Session Initiation Protocol (SIP) 'Resource-Priority' header field, which is used for communications resource prioritization.

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1. Introduction

PASSporT [I-D.ietf-stir-passport] is a token format based on JSON Web Token (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 [RFC3261]. 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 [RFC3261], including Public Switched Telephone Network (PSTN) gateways and terminals, and by 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 [RFC7340] 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 extensions 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' header fields will allow a receiving entity to verify and act on the information with confidence that the information has 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. This PASSporT object is used to provide attestation of a calling user authorization for priority communications. This is necessary in addition to the PASSporT object that is used for calling user telephone number attestation. How the optional extension to PASSporT is used for real-time communications supported using SIP 'Resource-Priority' header field 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] and in RFC 8174 [RFC8174].

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 field.

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 = "Resource-Priority": r-value, where r-value= "namespace "." priority value") based on [RFC4412]. Specifically, the "rph" claim includes assertion of the priority-level of the user to be used for a given communication session. The value of the "rph" claim is an Object with one or more keys. Each key is associated with a JSON Array. These arrays contain Strings that correspond to the r-values indicated in the SIP 'Resource-Priority' header field.

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

```
{
  "orig": {"tn": "12155550112"},
  "dest": [{"tn": "12125550113"}],
  "iat": "1443208345",
  "rph": {"auth": ["ets.0", "wps.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 namespace of the "rph" claim and there is only one authority per claim. The authority MUST use its credentials (i.e., CERT) associated with the specific service supported by the SIP namespace in the claim. If r-values are added or dropped by the intermediaries along the path, intermediaries must generate a new "rph" header and sign the claim with its own authority.

The use of the compact form of PASSporT is not specified in this document.

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(backslashes shown for line folding only):

```
Identity:eyJhbGciOiJFUzI1NiIsInBwdCI6InJwaCI6InR5cCI6InBhc3Nwb3J0\
IiwieDV1IjoiaHR0cHM6Ly93d3cuZXhhbXBsZS5jb20vY2VydC5jZSIifQo.eyJkZ\
XN0Ijpb7WyJ0biI6IjEyMTU1NTUwMTEzIl19LCJpYXQiOiIxNDQzMjA4MzQ1Iiwib3\
JpZyI6eyJ0biI6IjEyMTU1NTUwMTEyIn0sInJwaCI6eyJhdXRoIjpbImV0cy4wIiw\
id3BzLjAiXX19Cg.s37S6VC8HM6Dl6YzJeQDsrZcwJ0lizxhUrA7f_98oWBHvo-cl\
-n8MIhoCr18vYYFy3blXvs3fslM_oos2P2Dyw;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 "." priority value" for r-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 "." priority value" pairs, either in a single SIP 'Resource-Priority' header field or across multiple SIP 'Resource-Priority' headers. An authority is responsible for signing all the content of a SIP 'Resource-Priority' header field for which it has the authority.

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' as indicated in the claim. This value would in turn be used for priority treatment in accordance with local policy for the associated communication service. If the signature validation fails, the verification service should infer that the calling party is not authorized for 'Resource-Priority' as indicated in the claim. In such cases, the priority treatment for the associated communication service is handled as per the local policy.

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 UA 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 6.2. The definition of the "rph" claim may have one or more such additional information field(s). Details of such "rph" claim to encompass other data elements are left for future version of this specification.

6. IANA Considerations

6.1. PASSporT Extension Claims Registration

This document registers a new "ppt" value for the "Personal Assertion Token (PASSporT) Extensions" table.

- o Claim Name: "rph"
- o Claim Description: Resource Priority Header Authorization

- o Change Controller: IESG
- o Specification Document(s): Section 3 of [RFCThis]

6.2. 'rph' Types

This specification also requests that the IANA creates a new registry for "rph" types. Each registry entry must contain two fields: the name of the "rph" type and the specification in which the type is described. This registry is to be initially populated with a single value for "auth" which is specified in [RFCThis]. Registration of new "rph" types shall be under the specification required policy.

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 paste attacks

The PASSporT extension with a "ppt" value of "rph" MUST only be sent with SIP INVITE when 'Resource-Priority' header field is used to convey the priority of the communication as defined in [RFC4412]. To avoid the replay, and cut and paste attacks, the procedures described in Section 10.1 of [I-D.ietf-stir-rfc4474bis] MUST be followed.

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 An authority (signer) is only allowed to sign the content of a SIP 'Resource-Priority' header field 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 resource priority namespace in the PASSporT.

7.3. Acknowledgements

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8. References

8.1. Normative References

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Authors' Addresses

Ray P. Singh
Vencore Labs
150 Mount Airy Road
New Jersey, NJ 07920
USA

Email: rsingh@vencorelabs.com

Martin Dolly
AT&T
200 Laurel Avenue
Middletown, NJ 07748
USA

Email: md3135@att.com

Subir Das
Vencore Labs
150 Mount Airy Road
New Jersey, NJ 07920
USA

Email: sdas@vencorelabs.com

An Nguyen
Office of Emergency Communication/DHS
245 Murray Lane, Building 410
Washington, DC 20528
USA

Email: an.p.nguyen@HQ.DHS.GOV