                  Additional Cryptographic Message Syntax (CMS)
                       Revocation Information Choices

Abstract

   The Cryptographic Message Syntax (CMS) allows revocation information
   to be conveyed as part of the SignedData, EnvelopedData,
   AuthenticatedData, and AuthEnvelopedData content types. The
   preferred format for revocation information is the Certificate
   Revocation List (CRL), but an extension mechanism supports other
   revocation information formats. This document defines two additional
   revocation information formats for Online Certificate Status Protocol
   (OCSP) responses and Server-Based Certificate Validation Protocol
   (SCVP) requests and responses.

Status of This Memo

   This is an Internet Standards Track document.

   This document is a product of the Internet Engineering Task Force
   (IETF). It represents the consensus of the IETF community. It has
   received public review and has been approved for publication by the
   Internet Engineering Steering Group (IESG). Further information on
   Internet Standards is available in Section 2 of RFC 5741.

   Information about the current status of this document, any errata,
   and how to provide feedback on it may be obtained at
   http://www.rfc-editor.org/info/rfc5940.

1. Introduction

   The RevocationInfoChoices type defined in [CMS] provides a set of
   revocation status information alternatives, which allows revocation
   information to be conveyed as part of the SignedData, EnvelopedData,
   AuthenticatedData, and AuthEnvelopedData content types. The intent
   is to provide information sufficient to determine whether the
   certificates and attribute certificates carried elsewhere in the CMS-
   protected content have been revoked. There may be more revocation
   status information than necessary or there may be less revocation
   status information than necessary.

   X.509 Certificate Revocation Lists (CRLs) [PROFILE] are the primary
   source of revocation status information, but any other revocation
   information format can be supported. This document specifies two
   other formats: Online Certificate Status Protocol (OCSP) responses
   [OCSP] and Server-Based Certificate Validation Protocol (SCVP)
   requests and responses [SCVP].

   Section 2 discusses the RevocationInformation structure. Section 3
   defines a mechanism to carry OCSP responses. Section 4 defines a
   mechanism to carry SCVP requests and responses. Appendix A provides
   the normative ASN.1 syntax for the two mechanisms.

1.1. Requirements 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 [WORDS].

2. Revocation Information

   For convenience, the ASN.1 definition of the RevocationInfoChoices
   type from [CMS] is repeated here:

   RevocationInfoChoices ::= SET OF RevocationInfoChoice

   RevocationInfoChoice ::= CHOICE {
     crl   CertificateList,
     other [1] IMPLICIT OtherRevocationInfoFormat }

   OtherRevocationInfoFormat ::= SEQUENCE {
     otherRevInfoFormat   OBJECT IDENTIFIER,
     otherRevInfo   ANY DEFINED BY otherRevInfoFormat }

   The other CHOICE MUST be used to convey OCSP responses, SCVP
   requests, and SCVP responses.

   This document defines the id-ri arc under which the revocation
   information formats are defined. The id-ri object identifier is:

   id-ri OBJECT IDENTIFIER ::= { iso(1) identified-organization(3)
     dod(6) internet(1) security(5) mechanisms(5) pkix(7) ri(16) }

   NOTE: Numbers 1 and 3 were assigned to CRL and Delta CRL. These two
   numbers are not used because these formats use the
   RevocationInfoChoice crl CHOICE when included in CMS [CMS].

3. OCSP Response

   To carry an OCSP response, the otherRevInfoFormat is set to
   id-ri-ocsp-response, which has the following ASN.1 definition:

   id-ri-ocsp-response OBJECT IDENTIFIER ::= { id-ri 2 }

   In this case, otherRevInfo MUST carry the OCSP response using the
   OCSPResponse type defined in [OCSP]. The responseStatus field MUST
   be successful and the responseBytes field MUST be present.

4. SCVP Request and Response

   Unlike OSCP, SCVP permits unprotected and protected responses, where
   protected responses can be digitally signed or include message
   authentication codes. While this provides more flexibility, it
   complicates implementations when an SCVP response can be validated by
   entities other than the entity that generated the SCVP request. If a
   lower layer provides authentication and integrity for the client-
   server interaction and the response is not protected, then a third

party cannot validate the response because there is no way to know
that the response was returned over a protected connection. If a
message authentication code is used, then the third party will be
unable to validate the message authentication code because it does
not possess the necessary private key. For these reasons, SCVP
responses sent to a third party MUST be signed by the SCVP server so
that the third party can validate them.

SCVP response validation requires matching it to the SCVP request.
This means that the SCVP request MUST always be included with the
response. SCVP permits the client to retain the response, and SCVP
permits the request to be returned in the response (in the requestReq
field). The request need not be protected for matching to be
performed; nonces and certIds can be checked.

To carry the SCVP request and response, the otherRevInfoFormat is set
to id-ri-scvp, which has the following ASN.1 definition:

id-ri-scvp OBJECT IDENTIFIER ::= { id-ri 4 }

In this case, the otherRevInfo MUST carry both the SCVP request and
response with the following structure:

SCVPReqRes ::= SEQUENCE {
  request [0] EXPLICIT ContentInfo OPTIONAL,
  response   ContentInfo }

The SCVPReqRes has the following fields:

o request contains the SCVP request. It contains the unprotected
  request, authenticated request, or the signed request. The request
  MUST be present if the response does not include the requestRef
  fullRequest field.

o response contains the SCVP response. It MUST contain the signed
  response. Additionally, the responseStatus MUST be okay.
  Unprotected and authenticated responses MUST NOT be included.

5. Security Considerations

The security considerations of [CMS], [CMS-ASN], [OCSP], [SCVP], and
[PROFILE-ASN] apply.

To locally store unprotected or authenticated SCVP responses, a
client can encapsulate the unprotected or authenticated SCVP response
in a SignedData. It is a matter of local policy whether these SCVP
responses that are encapsulated and signed by the client are
considered valid by another entity.

6. IANA Considerations

   This document makes use of object identifiers. These object
   identifiers are defined in an arc delegated by IANA to the PKIX
   Working Group. When the PKIX Working Group closes, this arc and its
   registration procedures will be transferred to IANA. No further
   action by IANA is necessary for this document or any anticipated
   updates.

7. References

7.1. Normative References

   [CMS]   Housley, R., "Cryptographic Message Syntax (CMS)", RFC
               5652, September 2009.

   [CMS-ASN]   Hoffman, P. and J. Schaad, "New ASN.1 Modules for
               Cryptographic Message Syntax (CMS) and S/MIME", RFC 5911,
               June 2010.

   [OCSP]   Myers, M., Ankney, R., Malpani, A., Galperin, S., and C.
               Adams, "X.509 Internet Public Key Infrastructure Online
               Certificate Status Protocol - OCSP", RFC 2560, June 1999.

   [PROFILE-ASN]
               Hoffman, P. and J. Schaad, "New ASN.1 Modules for the
               Public Key Infrastructure Using X.509 (PKIX)", RFC 5912,
               June 2010.

   [SCVP]   Freeman, T., Housley, R., Malpani, A., Cooper, D., and W.
               Polk, "Server-Based Certificate Validation Protocol
               (SCVP)", RFC 5055, December 2007.

   [WORDS]   Bradner, S., "Key words for use in RFCs to Indicate
               Requirement Levels", BCP 14, RFC 2119, March 1997.

   [X.680]   ITU-T Recommendation X.680 (2002) | ISO/IEC 8824- 1:2002.
               Information Technology - Abstract Syntax Notation One.

   [X.681]   ITU-T Recommendation X.681 (2002) | ISO/IEC 8824- 2:2002.
               Information Technology - Abstract Syntax Notation One:
               Information Object Specification.

   [X.682]   ITU-T Recommendation X.682 (2002) | ISO/IEC 8824- 3:2002.
               Information Technology - Abstract Syntax Notation One:
               Constraint Specification.

   [X.683]   ITU-T Recommendation X.683 (2002) | ISO/IEC 8824- 4:2002.
              Information Technology - Abstract Syntax Notation One:
              Parameterization of ASN.1 Specifications, 2002.

7.2. Informative References

   [PROFILE] Cooper, D., Santesson, S., Farrell, S., Boeyen, S.,
              Housley, R., and W. Polk, "Internet X.509 Public Key
              Infrastructure Certificate and Certificate Revocation List
              (CRL) Profile", RFC 5280, May 2008.

Appendix A.   ASN.1 Modules

   Appendix A.1 provides the normative ASN.1 definitions for the
   structures described in this specification using ASN.1 as defined in
   [X.680] for compilers that support the 1988 ASN.1.

   Appendix A.2 provides informative ASN.1 definitions for the
   structures described in this specification using ASN.1 as defined in
   [X.680], [X.681], [X.682], and [X.683] for compilers that support the
   2002 ASN.1. This appendix contains the same information as Appendix
   A.1 in a more recent (and precise) ASN.1 notation, however Appendix
   A.1 takes precedence in case of conflict.

A.1.   1988 ASN.1 Module

   CMS-Other-RIs-2009-88
     { iso(1) identified-organization(3) dod(6) internet(1) security(5)
       mechanisms(5) pkix(7) id-mod(0) id-mod-cms-otherRIs-2009-88(63)
     }

   DEFINITIONS IMPLICIT TAGS ::=

   BEGIN

   -- EXPORTS ALL
   IMPORTS

   -- FROM CMS [CMS]

   ContentInfo
     FROM CryptographicMessageSyntax2004
     { iso(1) member-body(2) us(840) rsadsi(113549) pkcs(1) pkcs-9(9)
       smime(16) modules(0) cms-2004(24) }

   ;

   id-ri OBJECT IDENTIFIER ::= { iso(1) identified-organization(3)
     dod(6) internet(1) security(5) mechanisms(5) pkix(7) ri(16) }

   -- RevocationInfoChoice for OCSP response
   -- OID included in otherRevInfoFormat
   -- signed OCSP response included in otherRevInfo

   id-ri-ocsp-response OBJECT IDENTIFIER ::= { id-ri 2 }

   -- RevocationInfoChoice for SCVP response
   -- OID included in otherRevInfoFormat
   -- SCVPReqRes included in otherRevInfo

```
   id-ri-scvp OBJECT IDENTIFIER ::= { id-ri 4 }

   SCVPReqRes ::= SEQUENCE {
     request  [0] EXPLICIT ContentInfo OPTIONAL,
     response     ContentInfo }

   END
```

A.2. 2002 ASN.1 Module

```
   CMS-Other-RIs-2009-02
     { iso(1) identified-organization(3) dod(6) internet(1) security(5)
       mechanisms(5) pkix(7) id-mod(0) id-mod-cms-otherRIs-2009-93(64)
     }

   DEFINITIONS IMPLICIT TAGS ::=

   BEGIN

   -- EXPORT ALL
   IMPORTS

   -- FROM [PROFILE-ASN]

   OCSPResponse
     FROM OCSP-2009
     { iso(1) identified-organization(3) dod(6) internet(1) security(5)
       mechanisms(5) pkix(7) id-mod(0) id-mod-ocsp-02(48) }

   -- FROM [CMS-ASN]

   ContentInfo, OTHER-REVOK-INFO
     FROM CryptographicMessageSyntax-2009
       { iso(1) member-body(2) us(840) rsadsi(113549) pkcs(1) pkcs-9(9)
         smime(16) modules(0) id-mod-cms-2004-02(41) }

   ;

   -- Defines OCSP and SCVP formats for RevocationInfoChoice

   SupportedOtherRevokInfo OTHER-REVOK-INFO ::= {
     ri-ocsp-response |
     ri-scvp,
     ... }

   ri-ocsp-response OTHER-REVOK-INFO ::= {
     OCSPResponse IDENTIFIED BY id-ri-ocsp-response }
```

```
   id-ri OBJECT IDENTIFIER ::= { iso(1) identified-organization(3)
     dod(6) internet(1) security(5) mechanisms(5) pkix(7) ri(16) }

   id-ri-ocsp-response OBJECT IDENTIFIER ::= { id-ri 2 }

   ri-scvp OTHER-REVOK-INFO ::= {
     SCVPReqRes IDENTIFIED BY id-ri-scvp }

   id-ri-scvp OBJECT IDENTIFIER ::= { id-ri 4 }

   SCVPReqRes ::= SEQUENCE {
     request  [0] EXPLICIT ContentInfo OPTIONAL,
     response     ContentInfo }

   END
```

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