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X.509 Certificate Extension for Secure/Multipurpose Internet Mail Extensions (S/MIME) Capabilities

Status of This Memo

This document specifies an Internet standards track protocol for the Internet community, and requests discussion and suggestions for improvements. Please refer to the current edition of the "Internet Official Protocol Standards" (STD 1) for the standardization state and status of this protocol. Distribution of this memo is unlimited.

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Abstract

This document defines a certificate extension for inclusion of Secure/Multipurpose Internet Mail Extensions (S/MIME) Capabilities in X.509 public key certificates, as defined by RFC 3280. This certificate extension provides an optional method to indicate the cryptographic capabilities of an entity as a complement to the S/MIME Capabilities signed attribute in S/MIME messages according to RFC 3851.

1. Introduction

This document defines a certificate extension for inclusion of S/MIME Capabilities in X.509 public key certificates, as defined by RFC 3280 [RFC3280].

The S/MIME Capabilities attribute, defined in RFC 3851 [RFC3851], is defined to indicate cryptographic capabilities of the sender of a signed S/MIME message. This information can be used by the recipient in subsequent S/MIME secured exchanges to select appropriate cryptographic properties.

However, S/MIME does involve also the scenario where, for example, a sender of an encrypted message has no prior established knowledge of the recipient's cryptographic capabilities through recent S/MIME exchanges.

In such a case, the sender is forced to rely on out-of-band means or its default configuration to select a content encryption algorithm for encrypted messages to recipients with unknown capabilities. Such default configuration may, however, be incompatible with the recipient's capabilities and/or security policy.

The solution defined in this specification leverages the fact that S/MIME encryption requires possession of the recipient's public key certificate. This certificate already contains information about the recipient's public key and the cryptographic capabilities of this key. Through the extension mechanism defined in this specification, the certificate may also identify the subject's cryptographic S/MIME capabilities. This may then be used as an optional information resource to select appropriate encryption settings for the communication.

This document is limited to the "static" approach where asserted cryptographic capabilities remain unchanged until the certificate expires or is revoked. Other "dynamic" approaches, which allow retrieval of certified dynamically updateable capabilities during the lifetime of a certificate, are out of scope of this document.

1.1. 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 [STDWORDS].

2. S/MIME Capabilities Extension

This section defines the S/MIME Capabilities extension.

The S/MIME Capabilities extension data structure used in this specification is identical to the data structure of the SMIMECapabilities attribute defined in RFC 3851 [RFC3851]. (The ASN.1 structure of smimeCapabilities is included below for illustrative purposes only.)

```
smimeCapabilities OBJECT IDENTIFIER ::=
   {iso(1) member-body(2) us(840) rsadsi(113549) pkcs(1)
   pkcs-9(9) 15}

SMIMECapabilities ::= SEQUENCE OF SMIMECapability

SMIMECapability ::= SEQUENCE {
   capabilityID OBJECT IDENTIFIER,
   parameters ANY DEFINED BY capabilityID OPTIONAL }
```

All content requirements defined for the SMIMECapabilities attribute in RFC 3851 apply also to this extension.

There are numerous different types of S/MIME Capabilities that have been defined in various documents. While all of the different capabilities can be placed in this extension, the intended purpose of this specification is mainly to support inclusion of S/MIME Capabilities specifying content encryption algorithms.

Certification Authorities (CAs) SHOULD limit the type of included S/MIME Capabilities in this extension to types that are considered relevant to the intended use of the certificate.

Client applications processing this extension MAY at their own discretion ignore any present S/MIME Capabilities and SHOULD always gracefully ignore any present S/MIME Capabilities that are not considered relevant to the particular use of the certificate.

This extension MUST NOT be marked critical.

3. Use in Applications

Applications using the S/MIME Capabilities extension SHOULD NOT use information in the extension if more reliable and relevant authenticated capabilities information is available to the application.

It is outside the scope of this specification to define what is, or is not, regarded as a more reliable source of information by the application that is using the certificate.

4. Security Considerations

The S/MIME Capabilities extension contains a statement about the subject's capabilities made at the time of certificate issuance. Implementers should therefore take into account any effect caused by the change of these capabilities during the lifetime of the certificate.

Change in the subject's capabilities during the lifetime of a certificate may require revocation of the certificate. Revocation should, however, only be motivated if a listed algorithm is considered broken or considered too weak for the governing security policy.

Implementers should take into account that the use of this extension does not change the fact that it is always the responsibility of the sender to choose sufficiently strong encryption for its information disclosure.

5. Normative References

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

[RFC3280] Housley, R., Polk, W., Ford, W., and D. Solo, "Internet X.509 Public Key Infrastructure Certificate and Certificate Revocation List (CRL) Profile", RFC 3280, April 2002.

[RFC3851] Ramsdell, B., "Secure/Multipurpose Internet Mail Extensions (S/MIME) Version 3.1 Message Specification", RFC 3851, July 2004.

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