

Internet Engineering Task Force (IETF)  
Internet Draft  
Intended Status: Informational  
Expires: August 2, 2014

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January 29, 2014

**The application/cms media type  
`draft-turner-application-cms-media-type-08.txt`**

#### Abstract

This document registers the application/cms media types for use with the corresponding CMS (Cryptographic Message Syntax) content types.

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## **1. Introduction**

[RFC5751] registered the application/pkc7-mime media type. That document defined five optional smime-type parameters. The smime-type parameter originally conveyed details about the security applied (signed or enveloped) to the data content type, hence signed-data and enveloped-data, the name of the data, and was later expanded to also indicate that the message was compressed, compressed-data, and that the message is a certs-only message. This document does not affect those registrations as this document places no requirements on S/MIME (Secure Multipurpose Internet Mail Extensions) agents.

The registration done by the S/MIME documents was done assuming that there would be a MIME (Multipurpose Internet Mail Extensions) wrapping layer around each of the different enveloping contents, thus there was no need to include more than one item in each smime-type. This is no longer the case with some of the more advanced enveloping types. Some protocols such as the CMC (Certificate Management over Cryptographic Message Syntax) [RFC5273] have defined additional S/MIME types. New protocols that intend to wrap MIME content should continue to define a smime-type string, however new protocols that intend to wrap non-mime types should use this mechanism instead.

CMS (Cryptographic Message Syntax) [RFC5652] associates a content type identifier (OID) with a content; CMS content types have been widely used to define contents that can be enveloped using other CMS content types and to define enveloping content types some of which provide security services. CMS protecting content types, those that provide security services, include: Signed Data [RFC5652], Enveloped Data [RFC5652], Digest Data [RFC5652], Encrypted Data [RFC5652], Authenticated Data [RFC5652], Authenticated Enveloped Data [RFC5083], and Encrypted Key Package [RFC6032]. CMS non-protecting content types, those that provide no security services but encapsulate other CMS content types, include: Content Information [RFC5652], Compressed Data [RFC3274], Content Collection [RFC4073], and Content With Attributes [RFC4073]. Then, there are the inner most content types that include: Data [RFC5652], Asymmetric Key Package [RFC5958], Symmetric Key Package [RFC6031], Firmware Package [RFC4108], Firmware Package Load Receipt [RFC4108], Firmware Package Load Error [RFC4108], Trust Anchor List [RFC5914], id-ct-KP-keyPackageReceipt [ID.housley-keypackage-receipt-n-error], TAMP Status Query, TAMP Status Response, TAMP Update, TAMP Update Confirm, TAMP Apex Update, TAMP Apex Update Confirmation, TAMP Community Update Confirm, TAMP Sequence Adjust, TAMP Sequence Adjust Confirmation, TAMP Error [RFC5934], Key Package Error, and Key Package Receipt [ID.housley-keypackage-receipt-n-error].

To support conveying CMS content types, this document defines a media



type and parameters that indicate the enveloping and embedded CMS content types.

New CMS content types should be affirmative in defining the string that identifies the new content type and should additionally define if the new content type is expected to appear in the `encapsulatedContent` or `innerContent` field.

### **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 [[RFC2119](#)].

## **2. CMS Media Type Registration Applications**

This section provides the media type registration application for the `application/cms` media type (see [[RFC6838](#), [Section 5.6](#)]).

Type name: `application`

Subtype name: `cms`

Required parameters: None.

Optional parameters:

`encapsulatingContent=y`; where `y` is one or more CMS ECT (Encapsulating Content Type) identifiers; multiple values are encapsulated in quotes and separated by a folding-whitespace comma folding-whitespace. ECT values are based on content types found in [[RFC3274](#)], [[RFC4073](#)], [[RFC5083](#)], [[RFC5652](#)], and [[RFC6032](#)]. This list can later be extended, see [Section 4](#).

`authData`  
`compressedData`  
`contentCollection`  
`contentInfo`  
`contentWithAttrs`  
`authEnvelopedData`  
`encryptedKeyPkg`  
`digestData`  
`encryptedData`  
`envelopedData`  
`signedData`

`innerContent=x`; where `x` is one or more CMS ICT (Inner Content Type) identifiers; multiple values encapsulated in quotes and are separated by a folding-whitespace comma folding-whitespace. ICT



values are based on content types found in [[RFC4108](#)], [[RFC5914](#)], [[RFC5934](#)], [[RFC5958](#)], [[RFC6031](#)], and [[ID.housley-keypackage-receipt-n-error](#)]. This list can later be extended, see [Section 4](#).

firmwarePackage  
firmwareLoadReceipt  
firmwareLoadError  
aKeyPackage  
sKeyPackage  
trustAnchorList  
tamp-status-query  
tamp-status-response  
tamp-update  
tamp-update-confirmed  
tamp-apex-update  
tamp-apex-update-confirmed  
tamp-community-update  
tamp-community-update-confirmed  
tamp-sequence-adjust  
tamp-sequence-adjust-confirmed  
tamp-error  
keyPackageReceipt  
keyPackageError

The optional parameters are case-sensitive.

Encoding considerations:

Binary.

[[RFC5652](#)] requires that the outer most encapsulation be ContentInfo.

Security considerations:

The following security considerations apply:

RFC	CMS Protecting Content Type and Algorithms
[ <a href="#">RFC3370</a> ]	signedData, envelopedData,
[ <a href="#">RFC5652</a> ]	digestedData, encryptedData, and
[ <a href="#">RFC5753</a> ]	authData
[ <a href="#">RFC5754</a> ]	
[ <a href="#">RFC5958</a> ]	aKeyPackage
[ <a href="#">RFC5959</a> ]	
[ <a href="#">RFC6162</a> ]	
[ <a href="#">RFC6031</a> ]	sKeyPackage



```
[RFC6160] |
+-----+
[RFC6032] | encryptedKeyPkg
[RFC6033] |
[RFC6161] |
+-----+
[RFC5914] | trustAnchorList
+-----+
[RFC3274] | compressedData
+-----+
[RFC5083] | authEnvelopedData
[RFC5084] |
+-----+
[RFC4073] | contentCollection and
           | contentWithAttrs
+-----+
[RFC4108] | firmwarePackage,
           | firmwareLoadReceipt, and
           | firmwareLoadError
+-----+
[RFC5934] | tamp-status-query, tamp-status-response,
           | tamp-update, tamp-update-confirmed,
           | tamp-apex-update,
           | tamp-apex-update-confirmed,
           | tamp-community-update,
           | tamp-community-update-confirmed,
           | tamp-sequence-adjust,
           | tamp-sequence-adjust-confirmed, and
           | tamp-error
+-----+
[ID.housley-keypackage-receipt-n-error] |
       | keyPackageReceipt and keyPackageError
+-----+
```

In some circumstances, significant information can be leaked by disclosing what the innermost ASN.1 structure is. In these cases it is acceptable to disclose the wrappers without disclosing the inner content type.

ASN.1 encoding rules (e.g., DER and BER) have a type-length-value structure, and it is easy to construct malicious content with invalid length fields that can cause buffer overrun conditions. ASN.1 encoding rules allows for arbitrary levels of nesting, which may make it possible to construct malicious content that will cause a stack overflow. Interpreters of ASN.1 structures should be aware of these issues and should take appropriate measures to guard against buffer overflows and stack overruns in particular and malicious content in general.



Interoperability considerations:

See [[RFC3274](#)], [[RFC4073](#)], [[RFC4108](#)], [[RFC5083](#)], [[RFC5652](#)], [[RFC5914](#)], [[RFC5934](#)], [[RFC5958](#)], [[RFC6031](#)], [[RFC6032](#)], and [[ID.housley-keypackage-receipt-n-error](#)].

In all cases, CMS content types are encapsulated within ContentInfo structures [[RFC5652](#)]; that is the outer most enveloping structure is ContentInfo.

CMS [[RFC5652](#)] defines slightly different processing rules for SignedData than does PKCS #7 [[RFC2315](#)]. This media type employs the CMS processing rules.

The Content-Type header field of all application/cms objects SHOULD include the optional "encapsulatingContent" and "innerContent" parameters.

The Content-Disposition header field [[RFC4021](#)] can also be included along with Content-Type's optional name parameter.

Published specification: This specification.

Applications which use this media type:

Applications that support CMS (Cryptographic Message Syntax) content types.

Additional information:

Magic number(s): None

File extension(s): .cmsc

Macintosh File Type Code(s):

Person & email address to contact for further information:

Sean Turner <[turners@ieca.com](mailto:turners@ieca.com)>

Restrictions on usage: none

Author: Sean Turner <[turners@ieca.com](mailto:turners@ieca.com)>

Intended usage: COMMON

Change controller: The IESG <[iesg@ietf.org](mailto:iesg@ietf.org)>



### 3. Example

The following is an example encrypted status response message:

```
MIME-Version: 1.0
Content-Type: application/cms; encapsulatingContent=encryptedData;
               innerContent=TAMP-statusResponse; name=status.cmsc
Content-Transfer-Encoding: base64
```

```
MIIFLQYJKoZIhvNAQcDoIIFHjCCBRoCAQAxggFhMIIBXQIBADBFMEAxC
zAJBgNVBAYTA1VTMR8wHQYDVQQKExzUZXN0IE1lcnRpZmljYXRlcAyMD
ExMRAwDgYDVQQDEwdHb29kIENBAgEBMA0GCSqGSIB3DQEBAQUABIABEAa
uaXQeVs0yZ7gz0pJikRQ6Jqr64k2dbHBE4SDZL/uErP9FJUIja9LaJrc5
S83EZ7wf3m0DUBaDhGfQVKoPrNTsLmw98fE/0+wcdpI2XKaILOR62xDJR
emQQST+EPfMwZmCwgsImmY3AxefAgzp8hVgK7SDiXGXfa9ux9PMdCSjHP
IgcAUFHmTiqxYd72G108kLCMIXmn3g5RsYUggxooeFNHiFNR28TV5HctG
i6Ay5++iKUGrUQyXD+GlwakFToGFmFj3FMyZi7+kYV/X00BiBP3kpIgVJ
4jCj+nYtKwh6JXPoEqEsa39GmDEFGq4/58GEu70amWvW1DA++7KDp4gwg
g0uBgkqhkiG9w0BBwEwHQYJYIZIAWDBAECBBCH5yTQqZ4KYiTTeYdjoY
4sgIIDgArSp0cengKnZS4SCjfuQkMxB5wfSaud1thlZ+gUFCgbFtkfYM
Qx/T7gnkneniyj2rw0mZxCQXpPlCDXH6mS83ngfrNN8ay3HrMPpVkE0mW
UMc5jI6oN0bwqi8a3ezzhYRx06jzdD2R/6SAPALz3Q4NU8eX+PnuekgR
oxo/INzhT4iGvokn9xVah6piSbjhPA+QZp1HgQrlWyyM31G9jn4thchK1
FQqZEy/EBaCwq+sJG7LLxqS5k29CiAVx0JSItqAPvX1ZvLMY2aq//MQMw
0VFEx7Kt5aWnvKHTor9RUuzwiZ5kwXt2vJt6bFiV7yS+EXofpFEmqyJP
VJzyAFIXJRTv4k007n0M1UpXQpGjywECI6DbIhfBL8CsNsTCjrsfU+Tw
RRkRKAbtJYughs9bDYkDu9UsKd/AE4zXk4prwo8/f1chpmzpHK0XiWzt+
xaCj648I4r0jdI9s4JP8J0qwVKoLEMGeiZlf2UlaiyMZZYzT0xI03PHp1
Whk6TXhnmmVPWGYjjelvE38gq/XynobbQRGEJdnnHzH7SrS27FmgRcnB0
3QQUPJChVn7iBHmdi++GAxpHoGdS6nSo4kQ6d5u5rL/Ctcnwu0k+s0Xi
ZMz0qp7L31x11jvYUWIswLQYsIFoiejU3UTKzq/Cpd5MK+I8cwCM3aQ2c
D08URTPgu+U92pnYqm3auptywyjGAU/hkZ13XN7YRhLk/kuX8QXo3tZdj
dKA4f/uNf1DURpJK9004uCkxuAtu5HemMv7YPTTx9Ua2pZFW50+k2Mf2Z
F/ge0vtNw7UV8w0T1nokXu9lnIZ9Xcs1cGGmRYE7jW15F07uGnMi1s2Gt
LAST7t/P1TNZU6h0rVExErVa7T+VNidrgwGIke0YqYIwvTINRs+9VeJE3
AJeatD1Qs+01jrqqFWWmGmmsEBTRuoDQHK7YBFFy4xIwQqZGW0EVre39
OU5CL5LHIYiAVoV16YwiGd5WvFF8P1ZJK4ki8GFgYiMcPKmjQgP7DumqG
n7eQtMD5tezTQeC07ntV3bi5pdznZHVCf2Kqg+qHjJQlhUdK7Pew3kq7k
mfCdQV0BmQSYyjEAaTijaw4fAMxAbiw40U0eNeU//zcpp04AuTFFJorIg
oZ+ictYei8HMUA9/ysLFXA64wdsuCj0zXmNiYwosisuNg3TXfoB0zohKq
fkext
```



#### 4. IANA Considerations

IANA is asked to register the media type application/cms in the Standards tree using the applications provided in [Section 2](#) of this document.

IANA is also asked to establish two subtype registries called "CMS Encapsulating Content Types" and "CMS Inner Content Types". Entries in these registries is by Expert Review [[RFC5226](#)]. The Expert will determine whether the content is an ECT or an ICT; where the rule is that an ICT does not encapsulate another content type while an ECT does encapsulate another content type.

Initial values are as follows:

##### CMS Encapsulating Content Types

Name	Document   Object Identifier
authData	[ <a href="#">RFC5652</a> ]   1.2.840.113549.1.9.16.1.2
compressedData	[ <a href="#">RFC3274</a> ]   1.2.840.113549.1.9.16.1.9
contentCollection	[ <a href="#">RFC4073</a> ]   1.2.840.113549.1.9.16.1.19
contentInfo	[ <a href="#">RFC5652</a> ]   1.2.840.113549.1.9.16.1.6
contentWithAttrs	[ <a href="#">RFC4073</a> ]   1.2.840.113549.1.9.16.1.20
authEnvelopedData	[ <a href="#">RFC5083</a> ]   1.2.840.113549.1.9.16.1.23
encryptedKeyPkg	[ <a href="#">RFC6030</a> ]   2.16.840.1.101.2.1.2.78.2
digestData	[ <a href="#">RFC5652</a> ]   1.2.840.113549.1.9.16.1.5
encryptedData	[ <a href="#">RFC5652</a> ]   1.2.840.113549.1.9.16.1.6
envelopedData	[ <a href="#">RFC5652</a> ]   1.2.840.113549.1.9.16.1.3
signedData	[ <a href="#">RFC5652</a> ]   1.2.840.113549.1.9.16.1.2



## CMS Inner Content Types

Name	Document   Object Identifier
firmwarePackage	[ <a href="#">RFC4108</a> ]   1.2.840.113549.1.9.16.1.16
firmwareLoadReceipt	[ <a href="#">RFC4108</a> ]   1.2.840.113549.1.9.16.1.17
firmwareLoadError	[ <a href="#">RFC4108</a> ]   1.2.840.113549.1.9.16.1.18
aKeyPackage	[ <a href="#">RFC5958</a> ]   2.16.840.1.101.2.1.2.78.5
sKeyPackage	[ <a href="#">RFC6031</a> ]   1.2.840.113549.1.9.16.1.25
trustAnchorList	[ <a href="#">RFC5914</a> ]   1.2.840.113549.1.9.16.1.34
TAMP-statusQuery	[ <a href="#">RFC5934</a> ]   2.16.840.1.101.2.1.2.77.1
TAMP-statusResponse	[ <a href="#">RFC5934</a> ]   2.16.840.1.101.2.1.2.77.2
TAMP-update	[ <a href="#">RFC5934</a> ]   2.16.840.1.101.2.1.2.77.3
TAMP-updateConfirm	[ <a href="#">RFC5934</a> ]   2.16.840.1.101.2.1.2.77.4
TAMP-apexUpdate	[ <a href="#">RFC5934</a> ]   2.16.840.1.101.2.1.2.77.5
TAMP-apexUpdateConfirm	[ <a href="#">RFC5934</a> ]   2.16.840.1.101.2.1.2.77.6
TAMP-communityUpdate	[ <a href="#">RFC5934</a> ]   2.16.840.1.101.2.1.2.77.7
TAMP-communityUpdateConfirm	[ <a href="#">RFC5934</a> ]   2.16.840.1.101.2.1.2.77.8
TAMP-seqNumAdjust	[ <a href="#">RFC5934</a> ]   2.16.840.1.101.2.1.2.77.10
TAMP-seqNumAdjustConfirm	[ <a href="#">RFC5934</a> ]   2.16.840.1.101.2.1.2.77.11
TAMP-error	[ <a href="#">RFC5934</a> ]   2.16.840.1.101.2.1.2.77.9
keyPackageReceipt	[ <a href="#">ID.housley-keypackage-receipt-n-error</a> ]   2.16.840.1.101.2.1.2.78.3
keyPackageError	[ <a href="#">ID.housley-keypackage-receipt-n-error</a> ]   2.16.840.1.101.2.1.2.78.6

## 5. Security Considerations

See the answer to the Security Considerations template questions in [Section 2](#).

## 6. Acknowledgments

Special thanks to Carl Wallace for generating the example in [Section 3](#).

## 7. References

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