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Protecting Multiple Contents with the
Cryptographic Message Syntax (CMS)

<[draft-housley-contentcollection-05.txt](#)>

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Abstract

This document describes a convention for using the Cryptographic Message Syntax (CMS) to protect more than one content. If desired, attributes can be associated with the content.

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[1](#) Introduction

This document describes a convention for using the Cryptographic Message Syntax (CMS) [CMS] to protect more than one content. The content collection content type is used to transfer one or more contents, each identified by a content type. If desired, the content with attributes content type can be used to associate arbitrary attributes with the content.

When CMS is used with MIME [MSG], there is no need to use this specification. In this processing environment, MIME multipart [MIME] provides a straightforward and widely deployed mechanism for carrying more than one content, each associated with a MIME type.

CMS is not always used with MIME. Sometimes CMS is used in an exclusively ASN.1 [ASN1] environment. In this case, the content collection content type is used to gather more than one content, each with an object identifier to provide the content type.

[1.1](#) Terminology

In this document, the key words MUST, MUST NOT, REQUIRED, SHOULD, SHOULD NOT, RECOMMENDED, MAY, and OPTIONAL are to be interpreted as described in [STDWORDS].

[1.2](#) Content Collection Example

This section provides one simple example to motivate the need for the content collection content type.

Consider an art collector who wants to sell one of his pieces, an ancient Greek urn, called an amphora. The collector wants to compose a digitally signed offer for sale. It includes three parts. The first part contains the owner's offer for sale, including the asking price. The second part contains a high-quality image of the amphora. The final part contains an appraisal from a well-respected ceramics expert. The final part is digitally signed by the expert. Figure 1 illustrates the structure, and the CMS SignedData content type is used for the two digital signatures.

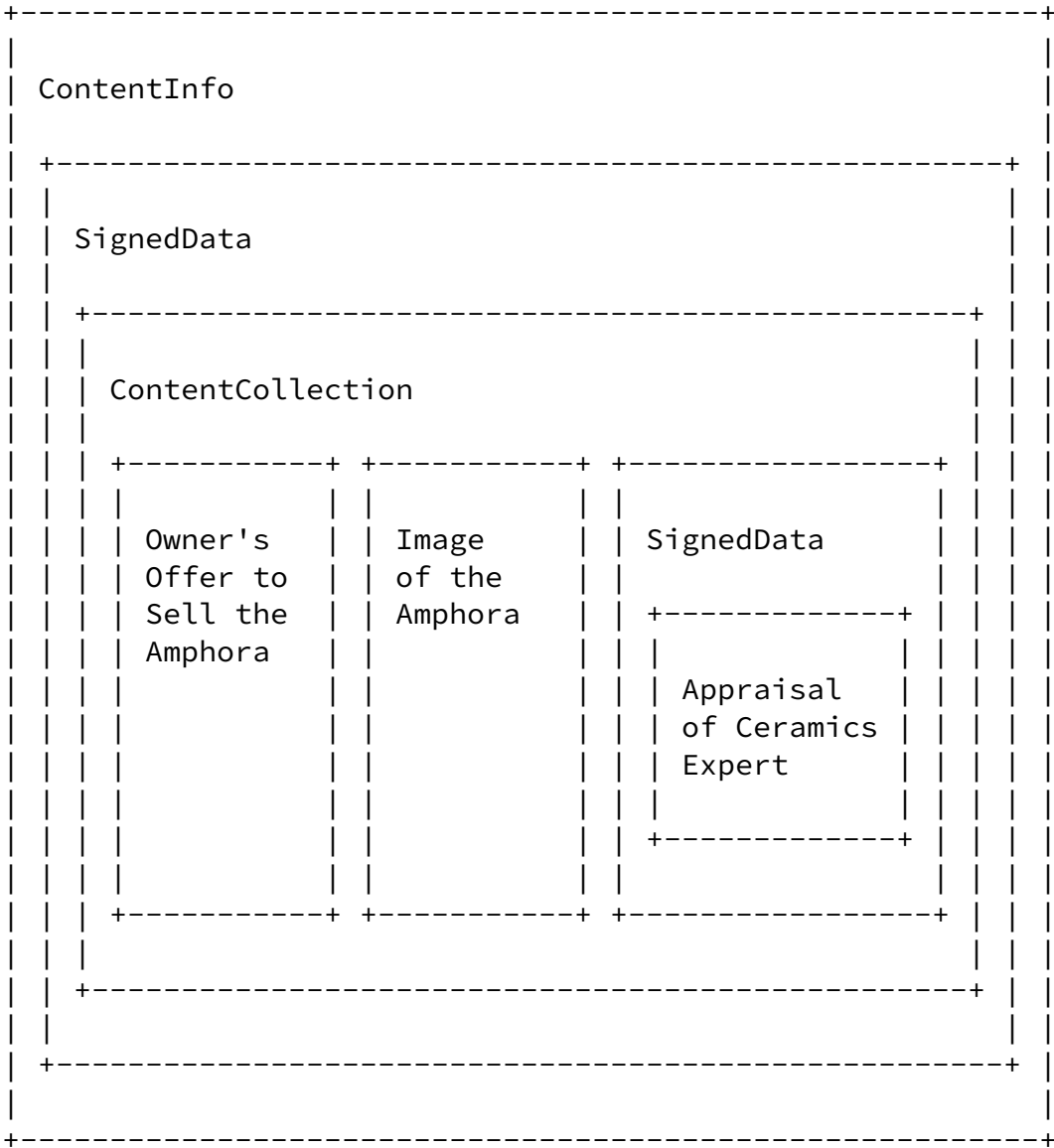


Figure 1. Sample use of the ContentCollection Content Type.

1.3 Content with Attributes Example

This section provides one simple example to motivate the need for the content with attributes content type.

Consider the same art collector as in the previous example. Instead of providing a single image of the amphora, the collector provides several images. To aid potential buyers, the collector attaches several attributes to each image. The attributes provide information about the resolution of the image, the date the image was taken, the photographer, and so on. Figure 2 illustrates the collection of images, showing only two images, each with three attributes. This

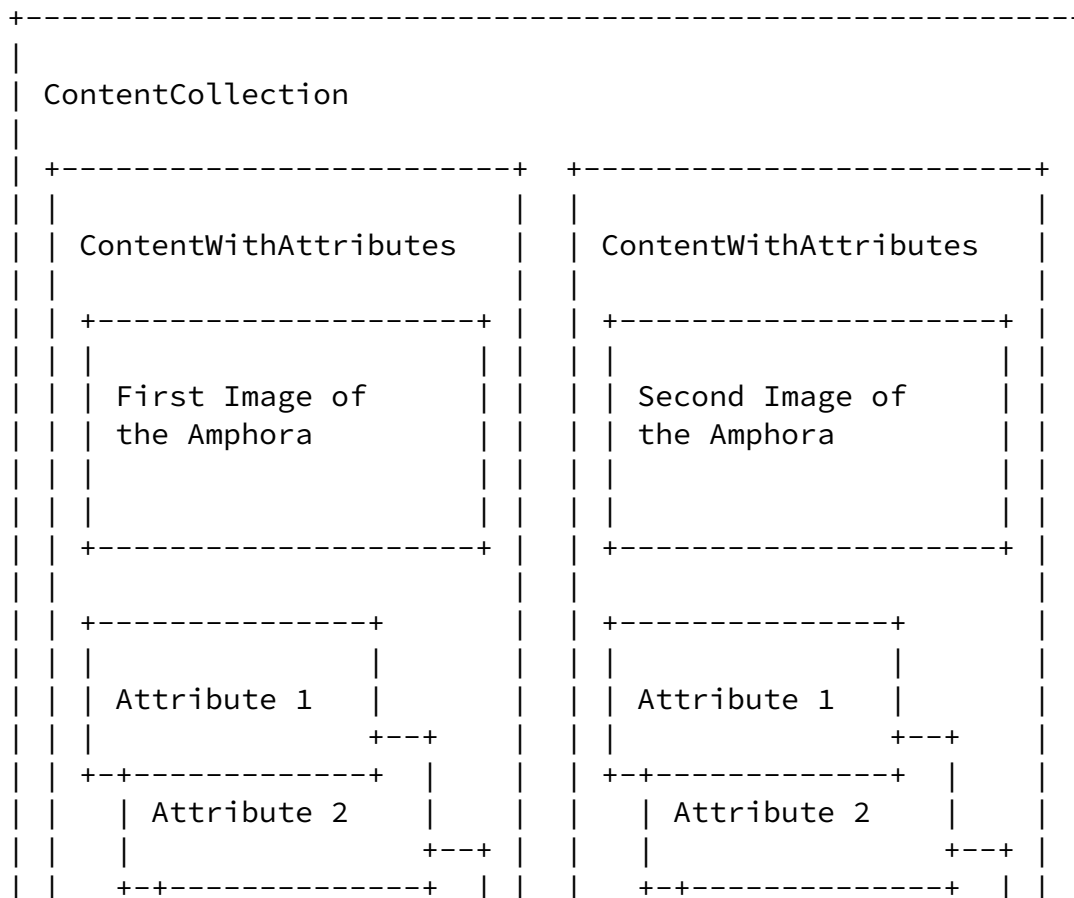
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entire image content collection could be carried instead of the single image shown in Figure 1, allowing it to be covered by the collector's digital signature.



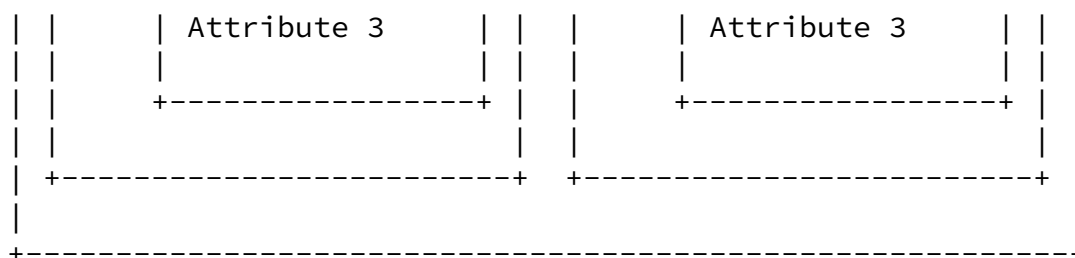


Figure 2. Sample use of the ContentWithAttributes Content Type.

2 Content Collection Content Type

The content collection content type is used to transfer one or more contents, each identified by a content type. The syntax accommodates contents with varying levels of protection. For example, a content collection could include CMS protection content types as well as unprotected content types. A content collection is expected to be

encapsulated in one or more CMS protecting content types, but this is not required by this specification.

The following object identifier names the content collection content type:

```
id-ct-contentCollection OBJECT IDENTIFIER ::= {
    iso(1) member-body(2) us(840) rsadsi(113549) pkcs(1)
    pkcs9(9) smime(16) ct(1) 19 }
```

The content collection content has the following syntax:

```
ContentCollection ::= SEQUENCE SIZE (1..MAX) OF ContentInfo
```

The ContentCollection contains a sequence of ContentInfo, one for each content in the collection. The ContentInfo structure is defined in CMS. The contentType object identifier within the ContentInfo indicates the type of the associated content. Implementations of this specification SHOULD be prepared to handle object identifiers for the SignedData, EncryptedData, EnvelopedData, and AuthenticatedData content types as specified in [CMS]. Implementations of this specification SHOULD also be prepared to

handle the object identifier for the CompressedData content type as specified in [COMPRESS].

[3](#) Content With Attributes Content Type

The content with attributes content type is used to transfer a single content, which is identified by a content type, and a collection of attributes associated with that content. The syntax accommodates an arbitrary number of attributes; however, there must be at least one attribute.

The following object identifier names the content with attributes content type:

```
id-ct-contentWithAttrs OBJECT IDENTIFIER ::= {
    iso(1) member-body(2) us(840) rsadsi(113549) pkcs(1)
    pkcs9(9) smime(16) ct(1) 20 }
```

The content with attributes content has the following syntax:

```
ContentWithAttributes ::= SEQUENCE {
    content      ContentInfo,
    attrs        SEQUENCE SIZE (1..MAX) OF Attribute }
```

The ContentWithAttributes contains a sequence of a single ContentInfo, followed by a sequence of attributes. The ContentInfo

structure is defined in CMS. The contentType object identifier within the ContentInfo indicates the type of the content. The Attribute structure was originally defined in X.501 [X501], and the definition is repeated in CMS.

[4](#) References

This section provides normative and informative references.

[4.1](#) Normative References

- | | |
|----------|---|
| ASN1 | CCITT. Recommendation X.208: Specification of Abstract Syntax Notation One (ASN.1). 1988. |
| COMPRESS | Gutmann, P. Compressed Data Content Type for |

Cryptographic Message Syntax (CMS). [RFC 3274](#).
June 2002.

CMS Housley, R. Cryptographic Message Syntax. [RFC 3852](#).
July 2004.

STDWORDS Bradner, S. Key Words for Use in RFCs to Indicate
Requirement Levels. [RFC 2119](#). March 1997.

[4.2](#) Informative References

MIME Freed, N., and N. Borenstein. Multipurpose Internet Mail
Extensions (MIME) Part One: Format of Internet Message
Bodies. [RFC 2045](#), November 1996.

X501 CCITT. Recommendation X.501: The Directory -- Models.
1988.

[5](#) Security Considerations

The content collection content type is used to transfer one or more contents, each identified by a content type. The syntax accommodates contents with varying levels of protection. For example, a content collection could include CMS protection content types as well as unprotected content types. A content collection is expected to be encapsulated in one or more CMS protecting content types, but this is not required by this specification. As a result, implementations **MUST** be prepared to handle multiple levels of encapsulation.

The security considerations discussed in [CMS] are relevant when CMS is used to protect more than one content by making use of the content collection content type or content with attributes content type.

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[6](#) IANA Considerations

No IANA actions are needed.

[7](#) IPR Considerations

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The ASN.1 module contained in this appendix defines the structures that are needed to implement this specification. It is expected to be used in conjunction with the ASN.1 modules in [CMS] and [COMPRESS].

ContentCollectionModule

```
{ iso(1) member-body(2) us(840) rsadsi(113549) pkcs(1)
  pkcs-9(9) smime(16) modules(0) 26 }
```

DEFINITIONS IMPLICIT TAGS ::=
BEGIN

IMPORTS

Attribute, ContentInfo

FROM CryptographicMessageSyntax -- [CMS]

```
{ iso(1) member-body(2) us(840) rsadsi(113549)
  pkcs(1) pkcs-9(9) smime(16) modules(0) cms-2001(14) };
```

-- Content Collection Content Type and Object Identifier

```
id-ct-contentCollection OBJECT IDENTIFIER ::= {
  iso(1) member-body(2) us(840) rsadsi(113549) pkcs(1)
  pkcs9(9) smime(16) ct(1) 19 }
```

ContentCollection ::= SEQUENCE SIZE (1..MAX) OF ContentInfo

-- Content With Attributes Content Type and Object Identifier

```
id-ct-contentWithAttrs OBJECT IDENTIFIER ::= {
  iso(1) member-body(2) us(840) rsadsi(113549) pkcs(1)
  pkcs9(9) smime(16) ct(1) 20 }
```

ContentWithAttributes ::= SEQUENCE {

content ContentInfo,

attrs SEQUENCE SIZE (1..MAX) OF Attribute }

END

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