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Syntax for binding documents with time stamps

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#### Abstract

This document describes a syntax which can be used to bind a generic document (or any set of data, not necessarily protected by means of cryptographic techniques) to one or more time-stamp tokens obtained for that document, where "time-stamp token" has the meaning defined in [[TSP](#)].

Internet-Draft

timestampeddata

June 2007

Whereas digital time stamping has become the standard technique for proving the existence of a document before a certain point in time, there is not a generally accepted syntax for keeping together one document and the associated time-stamps in a single "bundle". Such a syntax would facilitate keeping track of which time-stamps belong to what documents and would therefore improve the efficiency of timestamp-aware applications.

This document proposes a simple syntax based on [\[CMS\]](#), by defining a new contentType.

#### Conventions used in this document

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](#) [\[KEYWORDS\]](#).

#### Table of Contents

|                   |                                      |                   |
|-------------------|--------------------------------------|-------------------|
| <a href="#">1</a> | Introduction.....                    | <a href="#">2</a> |
| <a href="#">2</a> | Syntax for TimeStampedData.....      | <a href="#">3</a> |
| <a href="#">3</a> | Compliance requirements.....         | <a href="#">4</a> |
| <a href="#">4</a> | Recommended processing.....          | <a href="#">5</a> |
| <a href="#">5</a> | Recommended file extentions.....     | <a href="#">6</a> |
| <a href="#">6</a> | Security Considerations.....         | <a href="#">6</a> |
| <a href="#">7</a> | IANA Considerations.....             | <a href="#">6</a> |
| <a href="#">8</a> | Acknowledgments.....                 | <a href="#">6</a> |
| <a href="#">9</a> | References.....                      | <a href="#">7</a> |
|                   | Author's Addresses.....              | <a href="#">7</a> |
|                   | Intellectual Property Statement..... | <a href="#">7</a> |
|                   | Disclaimer of Validity.....          | <a href="#">8</a> |

#### [1](#). Introduction

Digital time stamping has become the standard technique for proving the existence of a document before a certain point in time. Several digital signature legislations around the world embrace the concept and provide for time-stamping services as an approved means for attesting the signing time and/or for extending the validity of signed documents beyond the expiry date of the signer's certificate.

However, while digital time stamping enhances digital signature, its

value does not depend on this latter. It can obviously be useful to time-stamp a document even if this is not signed. And it can also be useful, or even mandatory in some cases, to time-stamp a document in its entirety, regardless of how many signatures it contains.

When a time-stamp is related to a digital signature, there already exist a way to keep the two pieces together: [\[TSP\]](#) describes how one or more TimeStampTokens can be included in a SignerInfo structure as unsigned attributes. On the other hand, when time-stamps are not related to a digital signature, there is no standard way to keep together the time-stamped document and the related time-stamps.

In such cases two approaches are typically being adopted:

- o time-stamps are kept as separate files (keeping track of what time-stamps belong to what documents is up to the user);
- o an ad hoc solution is adopted for specific applications, like e.g. a ZIP archive or a proprietary "envelope" of some kind.

Both solutions are obviously inadequate when interoperability is aimed at, like in this memo.

This document proposes a simple syntax for bundling one document (or a file of any kind, for that matter) to one or more [RFC3161](#)-compliant TimeStampTokens. The proposed syntax is broadly based on the [\[CMS\]](#) syntax.

## [2.](#) Syntax for TimeStampedData

The proposed data structure is called TimeStampedData. It is a new variation of ContentInfo [\[CMS\]](#) marked by the following specific contentType OID:

```
id-timestamped-data OBJECT IDENTIFIER ::= { iso(1) member-body(2)
us(840) rsadsi(113549) pkcs(1) pkcs7(7) 7 }
```

This particular OID signals that the content field of the ContentInfo has the following syntax:

```
TimeStampedData ::= SEQUENCE {
    version          INTEGER { v1(1) },
    fileName         UTF8String,
    mimeType         PrintableString,
    content          OCTET STRING,
    timeStamps      SET (SIZE(1..MAX)) OF TimeStampToken }
```

The version field contains the version number of the TimeStampedData syntax. The initial version number is 1.

The fileName field contains the original filename (without path) of the document which was time-stamped and whose content was inserted into the TimeStampedData structure.

The mimeType field contains a MIME type (according to [\[MIME\]](#)) for the bundled file. It is an advisory information which may help decide how to open the file after having "detached" it from the TimeStampedData structure, regardless of the filename extension (which could be missing or unknown).

The content field carries the entire content, in its original format, of the file which was time-stamped. The file need not be a document in the strict sense; it can be any kind of file (e.g. an executable, a database, etc).

The timeStamps field is a non-empty set of TimeStampToken items as defined in [\[TSP\]](#).

### [3.](#) Compliance requirements

Compliant applications SHALL always populate the fileName field of TimeStampedData structure with a non-empty string, which is supposed to be the real name of the time-stamped file. Path information SHOULD NOT be included. A valid example is "patent123.doc". An invalid example is "c:\Documents and settings\John\Desktop\patent123.doc".

Compliant applications SHALL always populate the mimeType field of TimeStampedData structure with a valid MIME content-type string. A valid example is "application/pdf". An invalid example is "unknown".

#### [4.](#) Recommended processing

When generating the TimeStampedData structure, applications are supposed to behave like follows:

- o populate the version field with the integer value v1(1);
- o populate the fileName field with the real name of the file, without path;
- o populate the mimeType field with an appropriate MIME type string, preferably, or at least with "application/octet-stream";
- o populate the content field with the entire contents of the file;
- o add one (or possibly more) TimeStampTokens;
- o insert the TimeStampedData into a ContentInfo structure, with the id-timestamped-data OID in the contentType field;
- o BER-encode the ContentInfo structure and save it with the same name of the time-stamped file, but with the file extension recommended in [section 5](#).

When parsing an existing TimeStampedData structure, applications are supposed to behave like follows:

- o check that the contentType field of the ContentInfo structure has

the expected value (id-timestamped-data) in its contentType field; then, extract the inner TimeStampedData structure and continue processing;

- o check the version field (it should be v1);
- o check the fileName field (it must not be empty) and keep it for later use;
- o check the mimeType field (it must not be empty) and keep it for later use;
- o read the content field and prepare to save it in a separate file and/or show it to the user;
- o check the timeStamps field (it must not be an empty SET); extract the individual TimeStampTokens and prepare to show them to the user and/or save them to separate files;

- o check that each TimeStampToken does indeed contain the hash of the time-stamped file, by recomputing the hash of the content field and comparing it with the hash contained into each TimeStampToken;
- o depending on the application, validate and/or show to the user each individual TimeStampToken;
- o depending on the application, show the time-stamped file to the user, possibly by activating a suitable external "viewer"; if the fileName extension is not sufficient to determine the suitable viewer, try using the mimeType field as an additional hint;
- o depending on the application, save the content field into a separate file with the name specified by the fileName field (or let the user specify the desired filename).

## [5.](#) Recommended file extensions

A file containing a TimeStampedData structure SHOULD bear the .tsd extension. Example: "patent123.tsd"

## [6.](#) Security Considerations

There are no security issues.

## [7.](#) IANA Considerations

This document defines one object identifier under the pkcs7 arc:

```
id-timestamped-data OBJECT IDENTIFIER ::= { iso(1) member-body(2)
us(840) rsadsi(113549) pkcs(1) pkcs7(7) 7 }
```

## [8.](#) Acknowledgments

This document was prepared using 2-Word-v2.0.template.dot.

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Santoni

Expires December 27, 2007

[Page 7]

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Internet-Draft

timestampeddata

June 2007

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