Signature Gateway Profile of the OASIS Digital Signature Service

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Abstract:

This draft profiles the OASIS DSS core protocol for signature gateway transformation processing. This profile is intended to be generic, so it may be combined with other profiles freely.

Status:

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http://www.oasis-open.org/committees/tc_home.php?wg_abbrev=dss

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1 Introduction

1.1 Profile Type

An OASIS DSS profile has exactly one class: *concrete* or *abstract*. The most significant difference between the two classes is that one may directly implement a concrete protocol; however, one may not claim conformance of a specific realization to an abstract protocol. A concrete profile sufficiently constrains the flexibility of the DSS core protocol **[DSSCore]** so that a profile-compliant client and server should be interoperable at the levels of the protocol as defined in the profile. An abstract profile requires further definition of a subordinate concrete profile before an implementer may create a conformant realization.

This document identifies one abstract profile and two concrete profiles. The abstract profile defines all definitions required for DSS interoperability with one exception: transmission binding.

The concrete profiles fill the gap by permitting an implementer to build a realization and claim Signature Gateway Profile realization by both conforming to the abstract profile, and conforming to a permissible transmission binding as defined in one of the concrete profiles.

The two concrete profiles identified in this document each a specific transmission binding:

- HTTP POST Transport Binding, or
- SOAP 1.2 Transport Binding.

The addition of security to these bindings is optional.

Subsequent revisions may either add new concrete profiles in separate documents, or as modifications to this document.

The following sections describe how to understand the rest of this document.

1.2 Overview (Non-Normative)

This document standardizes a Signature Gateway by profiling the DSS signing and verifying protocols **[DSSCore]**. This Signature Gateway transforms both *signing technology* and *credential logistics*. The signing technology specifies the mechanisms through which one creates and verifies a signature. Example technologies include, but are not limited to photocopied signatures, Public Key Infrastructure signatures, and signatures defined using symmetric keying material (see **[XMLDSIG]** for some symmetric specifications). Credential logistics, describes the means to distribute credentials to remote parties; and the associated vehicle for distributing trust. Although electronic means allows communication at a distance, geographic separation increases the difficulty of trusting one's peers. Credentials overcome many of the geographic impediments to trust; and the associated logistics securely define the means of managing the credential lifecycle, e.g., distribution, revocation, renewal, and retirement.

Each kind of technology and logistics has its own distinct advantages and disadvantages. As a result, no universal best-of-breed solution exists for all deployment scenarios. Some scenarios require different solutions for distinct spaces; and a gateway serves as an intermediary connector. The DSS Signature Gateway operates in the following use case. A signer applies its signing credential to create a signature. The signer does not transmit the signature directly to a recipient, because the recipient might not understand the signer's signature technology; and the recipient may not trust the signer's credential. Instead, the signer sends the signature to a mutually trusted Signature Gateway which transforms the signature into a format that the

recipient validates. The Gateway's transformation operation first validates the original signature, and then creates a new signature. Consider the following example. An organization may allow its employees and machines to trust communication that originates from within the security perimeter, while requiring extra security for externally-originated messages. Rather than distribute the means for secure interoperability throughout the enterprise and extranet, the organization may establish a trusted Signature Gateway. The Gateway validates its incoming messages from the external parties; and then marks the Gateway's stamp of approval which downstream servers consume.

The signature gateway profile may operate in multiple different deployment models. Two example models are described below.

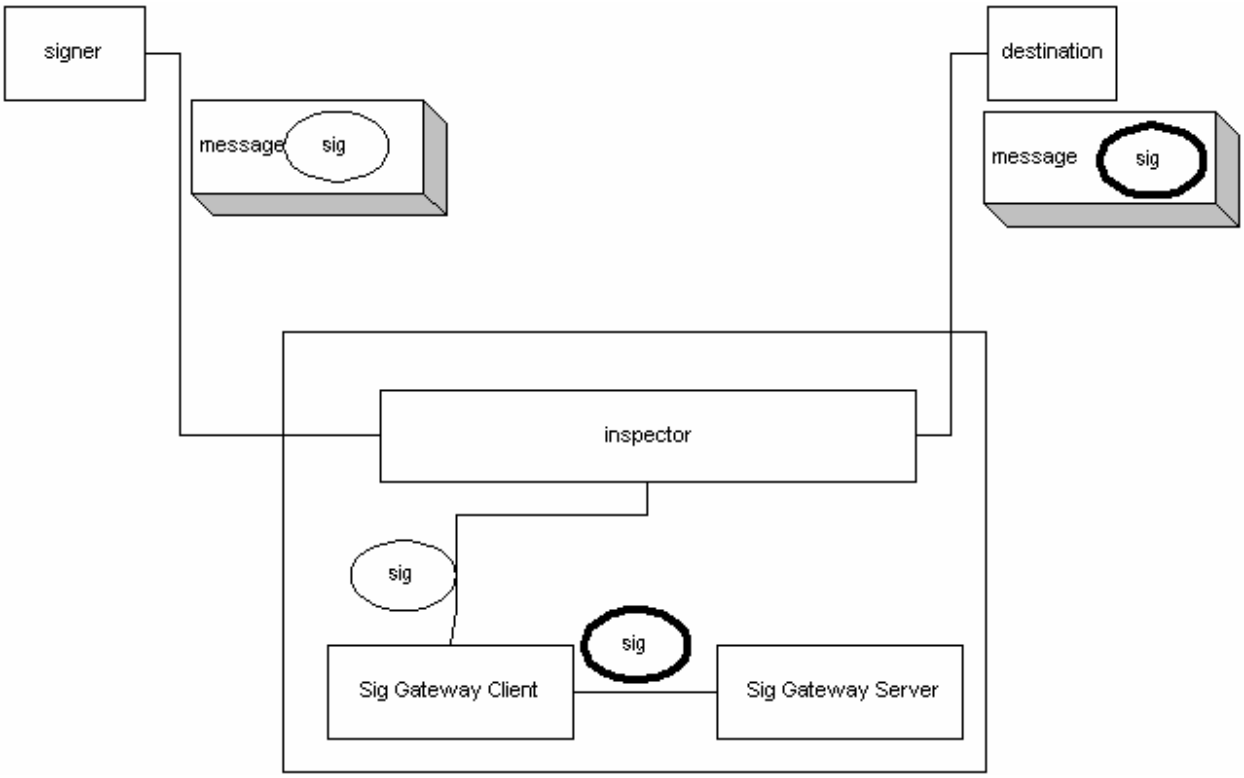
1.3 Request-Response Deployment Model

The request-response deployment model has three actors: signature client, DSS client, and DSS Signature Gateway Server.

1. The signature client signs a document or transaction, and sends the signed data to the DSS client.
2. The DSS client wraps the signed data in the context of DSS Signature Gateway Profile VerifyRequest, and sends the request to the DSS Signature Gateway Server.
3. The DSS Signature Gateway server performs the necessary validation services, and returns a DSS Signature Gateway VerifyResponse to the DSS client.

1.4 In-Line Deployment Model

Devices located at the security perimeter may combine Signature Gateway with other security services. Consider for example, deep packet inspection firewalls, content-inspecting load balancers, intelligent reverse proxies, or XML firewalls. These devices contain the technology to inspect incoming communication while searching for signatures. When the device identifies a signature within the context of a message, the device applies the Signature Gateway transformation, and then forwards the modified communication to the destination. The Figure below illustrates the constituent components:



The request-response deployment model has three actors: signer, inline proxy, and destination. The inline proxy has three constituent components: inspector, Signature Gateway Client, and Signature Gateway Server.

1. The signer sends a message that contains a signature to the in-line proxy.
2. The inspector component of the in-line proxy captures the message and searches for signed data. If the inspector identifies signed data, then the inspector passes the signed data to the DSS Signature Gateway Client.
3. The DSS Signature Gateway Client creates DSS Signature Gateway VerifyRequest using the signed data. The DSS client sends this VerifyRequest to the DSS Signature Gateway Server component.
4. The DSS Signature Gateway Server responds issuing a VerifyResponse.
5. The DSS client passes the response to the inspector component.
6. The inspector modifies the message per the response returned from the DSS Signature Gateway Server and sends the modified message to a downstream, destination application.

1.5 Notation

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this specification are to be interpreted as described in IETF RFC 2119 **[RFC 2119]**. These keywords are capitalized when used to unambiguously specify requirements over protocol features and behavior that affect the

interoperability and security of implementations. When these words are not capitalized, they are meant in their natural-language sense.

This specification uses the following typographical conventions in text: `<ns:Element>`, `Attribute`, **Datatype**, `OtherCode`.

1.6 Namespaces

Conventional XML namespace prefixes are used in this document:

- The prefix `dss:` (or no prefix) stands for the DSS core namespace **[Core-XSD]**.
- The prefix `ds:` stands for the W3C XML Signature namespace **[XMLDSIG]**.

Applications MAY use different namespace prefixes, and MAY use whatever namespace defaulting/scoping conventions they desire, as long as they are compliant with the Namespaces in XML specification **[XML-ns]**.

2 Profile Features

2.1 Identifier

urn:oasis:names:tc:dss:1.0:profiles:siggty

This identifier names an abstract profile. An <AdditionalProfile> identifier is mandatory in order to name a subordinate concrete profile.

2.1.1 Core HTTP Transport Binding

The following `<AdditionalProfile>` specifies a concrete profile:

urn:oasis:names:tc:dss:1.0:HTTP-POST-Transport-binding

This concrete profile requires:

- ingress: HTTP POST Transport binding as specified in the 1.0 core
- egress: unspecified

2.1.2 Core SOAP 1.2 Transport Binding

The following `<AdditionalProfile>` specifies a concrete profile:

urn:oasis:names:tc:dss:1.0:SOAP-Transport-binding

This concrete profile requires:

- ingress: SOAP 1.2 Transport binding as specified in the 1.0 core
- egress: unspecified

2.1.3 Other Transport Bindings Defined as Concrete Sub-Profiles

If the transport binding is defined as in a subordinate profile, then add the requisite identifier as an `<AdditionalProfile>`.

2.2 Scope

This document profiles the DSS signing and verifying protocols defined in **[DSSCore]** and profiles XML signature format for a signature gateway. This document permits other signature formats such as CMS **[RFC3369]**.

2.3 Relationship To Other Profiles

This profile is based directly on the **[DSSCore]**.

197

198 This document contains an abstract profile and two concrete protocols.

199 2.4 Signature Object

200 This profile supports the verification of incoming signatures and the production of a resultant
201 signature by the gateway. The profile MUST support XMLDSIG **[XMLDSIG]** for both incoming
202 and produced signatures. Other formats are optional. This means that a Signature Gateway
203 MAY accept incoming signatures in a non-XMLDSIG compliant format, e.g., CMS **[RFC3369]**.

204 2.5 Transport Binding

205 The combination of this abstract profile and a permissible transport binding provides sufficient
206 specification for interoperability. For the transport bindings see the concrete protocols:
207 **[DSSCore]** HTTP POST Transport binding as named by urn:oasis:names:tc:dss:1.0:HTTP-
208 POST-Transport-binding, and **[DSSCore]** SOAP Transport Binding as named by
209 urn:oasis:names:tc:dss:1.0:SOAP-Transport-binding.

210 Other permissible transport bindings may be defined in subordinate concrete profiles.

211 2.6 Security Binding

212 A security binding is permissible but not required. If used, this profile does not specify or
213 constrain the security binding.

3 Profile of Signing Protocol

3.1 Element <SignRequest>

The <dss:SignRequest> is not supported in the Signature Gateway Profile.

3.2 Element <SignResponse>

The <dss:SignResponse> is not supported in the Signature Gateway Profile.

4 Profile of Verifying Protocol

4.1 Element VerifyRequest

4.2 Element OptionalInputs

The Signature Gateway Profile MAY support any client or server optional input defined in **[DSSCore]**. However, some optional inputs are mandatory, or further clarified as described below.

4.2.1.1 Optional input < ServicePolicy >

The Signature Gateway MUST support the optional input defined in **[DSSCore]** `<dss:ServicePolicy>`. The `<dss:ServicePolicy>` MUST include a description of the signature that the Signature Gateway accepts (ingress). In addition `<dss:ServicePolicy>` MUST either include a description of the signature that the Signature Gateway produces (egress), or explicitly note the policy for the egress signature using the term “unspecified”.

The `<dss:ServicePolicy>` specification for the ingress signature MUST include the following items:

- The type of employed signature: **[XMLDSIG]** or **[RFC3369]**.
- Signature algorithm

The `<dss:ServicePolicy>` specification MAY include additional items such as signature attributes, properties, or policies. Topics include, but are not limited to the items on the following list:

- *Signed References and Properties:* Policy that determines if all the Signature Gateway validates some, or all of the signed references and properties such as the manifest, and timestamp.
- *Revocation:* Policy that specifies the rules by which the Signature Gateway checks revocation on the input signature
- *Signature Coverage:* Policy that determines if the Gateway’s signature covers the original document, the signature, the manifest, the signature properties, or some combination of the above.
- *Timestamp:* Policy that specifies any requirement for a timestamp, including the format.
- *Revocation:* Policy that specifies the format, and server that provides revocation information.

A Signature Gateway server MUST support at least one Service Policy. In the Signature Gateway Profile, the `<dss:ServicePolicy>` is NOT optional, i.e., the client must provide it in each request. A Signature Gateway MAY publish its service policy, where the means for publication is outside the scope of DSS.

4.2.1.2 OptionalInput < ReturnUpdatedSignature >

Each <dss:VerifyRequest> MUST contain the optional input defined in **[DSSCore]** <dss:ReturnUpdatedSignature>. The DSS Server MUST NOT sign the input document unless it first validates the input <dss:SignatureObject> successfully.

4.3 Element <VerifyResponse>

4.3.1 Element <ResultMajor>

If the <dss:VerifyRequest> misses any of the required <dss:OptionalInputs>, then the DSS server MUST return the following response in <dss:ResultMajor>.

urn:oasis:names:tc:dss:1.0:resultmajor:RequesterError

4.3.2 Element <ResultMinor>

If the <dss:VerifyRequest> misses any of the required <dss:OptionalInputs>, then the DSS server MUST return the following response in <dss:ResultMinor>:

urn:oasis:names:tc:dss:1.0:resultminor:siggty:NotSupported

The <dss:ResultMessage> SHOULD contain the identity of the missing required <dss:OptionalInputs>.

4.3.2.1 Signature type mismatch with requested key

If the <dss:VerifyRequest> explicitly specifies a <dss:KeySelector>, where the Signature Gateway's key is not valid, then the Signature Gateway MUST return an error with the following code in <dss:ResultMinor>:

urn:oasis:names:tc:dss:1.0:resultminor:siggty:KeyNotSupported

4.3.2.2 Signature policy not supported

If the <dss:VerifyRequest> explicitly specifies an unsupported <dss:ServicePolicy>, then the Signature Gateway MUST return an error with the following code in <dss:ResultMinor>.

urn:oasis:names:tc:dss:1.0:resultminor:siggty:ServicePolicyNotSupported

4.3.3 Element <OptionalOutputs>

4.3.3.1 OptionalOutput < UpdatedSignature >

If the Signature Gateway Server fails to validate the signature in the VerifyRequest, then the Signature Gateway Server MUST NOT include the <dss:UpdatedSignature>. If the Signature

289 Gateway Server successfully validates the signature in the VerifyRequest, then the Signature
290 Gateway Server SHOULD include the <dss:UpdatedSignature>

5 Profile of Signatures

The profile MAY support the XML Signature as defined in **[XMLDSIG]** or **[XAdES]**. within the `<ds:object>` element of the XML signature.

The profile MAY support the CMS signature as defined in **[RFC3369]** specified as a `<Base64Signature>` as defined in **[DSSCore]**.

6 Server Processing Rules

6.1 VerifyRequest

In addition to the processing specified in **[DSSCore]**, the DSS server additionally validates the existence of all required optional inputs. The DSS server MUST NOT produce a signature unless it first successfully validates the client's signature in accordance with the Service Policy.

7 References

7.1 Normative

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[RFC3369] R. Housley. *Cryptographic Message Syntax*. IETF RFC 3369, August 2002.

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[XAdES] XML Advanced Electronic Signatures ETSI TS 101 903, February 2002 *(shortly to be re-issued)*

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http://www.w3.org/TR/1999/REC-xml-names-19990114

[XMLDSIG] D. Eastlake et al. *XML-Signature Syntax and Processing.* W3C Recommendation, February 2002.

http://www.w3.org/TR/1999/REC-xml-names-19990114

Appendix A. Revision History

Rev	Date	By Whom	What
siggty-03	2004-13-Nov	Glenn Benson	Initial version with contributions from Burt Kaliski and John Linn
Siggty-06	2004-30-Dec	Glenn Benson	Update ServicePolicy per Trevor Perrin's suggestions; added to introduction; general cleanup
Siggty-07	2005-5-Mar	Glenn Benson	Converted from abstract to concrete profile in order to remove the transport binding
Siggty-08	2005-29-Mar	Glenn Benson	- single document with one abstract and two concrete identifiers: - Identifier only references the major version number - Introductory comments explaining additional concrete profiles may be made by either extending current document, or adding new documents
Siggty-09	2005-7-May	Glenn Benson	Incorporated comments from Nick Pope - added `unspecified' egress policy - added support for CMS - cleaned up definitions of concrete extensions
Siggty-10	2005-19-May	Glenn Benson	Additional comments from Nick Pope: all updates to 4.2.1.1 - describe mandatory elements of ingress signature - overview optional elements of ingress and egress signature - simplify description of publication of service policy
cd-01	2005-13-June	Glenn Benson	Change status to committee draft

Appendix B. Notices

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