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Technical Specification

Telecommunications and Internet Protocol Harmonization Over Networks (TIPHON); Open Settlement Protocol (OSP) for Inter-Domain pricing, authorization, and usage exchange

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650 Route des Lucioles
F-06921 Sophia Antipolis Cedex - FRANCE

Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - NAF 742 C
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Contents

Intellectual Property Rights	7
Foreword.....	7
Introduction	7
1 Scope	8
2 References	8
3 Abbreviations	9
4 Open Settlement Protocol Architecture.....	10
4.1 Communication Protocols	10
4.1.1 Secure Sockets Layer/Transport Layer Security	10
4.1.2 Hypertext Transfer Protocol	10
4.2 Message Format	11
4.2.1 Multipurpose Internet Mail Extensions.....	11
4.2.2 Extensible Markup Language	11
4.2.3 Secure MIME.....	12
5 Protocol Profiles	12
5.1 Secure Sockets Layer/Transport Layer Security	12
5.1.1 Protocol Version	12
5.1.2 Client/Server Roles	12
5.1.3 CipherSuites.....	12
5.2 Hypertext Transfer Protocol.....	12
5.2.1 Protocol Version	12
5.2.2 Client/Server Roles	12
5.2.3 TCP Port	13
5.2.4 HTTP Methods	13
5.2.5 Uniform Resource Identifier	13
5.2.6 HTTP Headers	13
5.2.7 HTTP Entity Body	13
6 XML Content	13
6.1 Document Structure.....	13
6.1.1 Multipurpose Internet Mail Extensions Conformance	13
6.1.1.1 Content-Type	13
6.1.1.2 Content-Length	14
6.1.1.3 Transfer Encoding.....	14
6.1.2 XML Conformance.....	14
6.1.2.1 XML Version	14
6.1.2.2 Well-Formed Constraint.....	14
6.1.2.3 Character Encoding.....	14
6.1.3 XML Framework	15
6.1.3.1 Root Entity	15
6.1.3.2 Random Attribute.....	15
6.1.3.3 Identifier Attribute	15
6.1.3.4 Critical Attribute	16
6.1.3.5 Extensions	16
6.2 Components.....	16
6.2.1 PricingIndication.....	16
6.2.2 PricingConfirmation	17
6.2.3 AuthorizationRequest	17
6.2.4 AuthorizationResponse	18
6.2.5 AuthorizationIndication	18
6.2.6 AuthorizationConfirmation.....	18
6.2.7 UsageIndication	18

6.2.8	UsageConfirmation	18
6.2.9	ReauthorizationRequest	19
6.2.10	ReauthorizationResponse	19
6.2.11	SubscriberAuthenticationRequest	19
6.2.12	SubscriberAuthenticationResponse	19
6.2.13	CapabilitiesIndication	19
6.2.14	CapabilitiesConfirmation	20
6.3	Elements	20
6.3.1	Amount	20
6.3.2	AuthorityURL	20
6.3.3	CallId	20
6.3.4	Code	21
6.3.5	Currency	21
6.3.6	Description	22
6.3.7	Destination	22
6.3.8	DestinationAlternate	22
6.3.9	DestinationInfo	22
6.3.10	DestinationSignalAddress	23
6.3.11	Increment	23
6.3.12	MaximumDestinations	23
6.3.13	Role	23
6.3.14	Service	24
6.3.15	SourceAlternate	24
6.3.16	SourceInfo	24
6.3.17	SourceSignalAddress	24
6.3.18	Status	25
6.3.19	Timestamp	25
6.3.20	Token	25
6.3.21	TransactionId	25
6.3.22	Unit	26
6.3.23	UsageDetail	26
6.3.24	ValidAfter	26
6.3.25	ValidUntil	26
6.3.26	EndTime	26
6.3.27	StartTime	26
6.3.28	TCCCode	27
6.3.29	TerminationCause	28
6.3.30	Certificate	28
6.3.31	CertificateChain	28
6.3.32	OSPCapability	29
6.3.33	OSPService	29
6.3.34	OSPServiceURL	29
6.3.35	OSPSignatureRequired	29
6.3.36	OSPVersion	30
6.3.37	SubscriberAuthenticationInfo	30
6.3.38	DeviceInfo	30
6.3.39	DeviceId	30
6.3.40	Resources	30
6.3.41	DataRate	30
6.3.42	NumberOfChannels	31
6.3.43	Bandwidth	31
6.3.44	AlmostOutOfResources	31
7	Signature Format	31
7.1	Canonical Form	31
7.2	Signature Algorithms	32
7.3	Transfer Encoding	32
8	Protocol Behaviour	32
8.1	Message Sequencing	32
8.2	Exception Handling	33
8.2.1	Transmission Control Protocol	33

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8.2.2	Secure Socket Layer/Transport Layer Security	33
8.2.3	Hypertext Transfer Protocol	34
8.2.4	Status Element	34
Annex A (normative): Document Type Definition		35
Annex B (normative): Cryptographic Algorithms.....		38
B.1	SSL/TLS CipherSuites	38
B.2	S/MIME Signatures.....	38
B.3	Tokens	38
Annex C (normative): Enhanced Usage Reports.....		39
C.1	Enhanced Usage Elements	39
C.1.1	Statistics	39
C.1.2	LossSent	39
C.1.3	Packets.....	39
C.1.4	Fraction	39
C.1.5	LossReceived	39
C.1.6	OneWayDelay	39
C.1.7	Minimum.....	40
C.1.8	Mean.....	40
C.1.9	Variance	40
C.1.10	Samples	40
C.1.11	RoundTripDelay.....	40
Annex D (informative): Token Formats.....		41
D.1	Cryptographic Encoding.....	41
D.2	Token Content	42
D.2.1	ASN.1 Format	42
D.2.2	XML Format	43
D.2.3	Binary XML Format.....	43
D.3	Token Carriage.....	43
D.4	Sample Token.....	45
Annex E (informative): Example Messages		46
E.1	Pricing Exchange.....	46
E.2	Authorization Exchange	48
E.3	Usage Exchange	50
E.4	Subscriber Authentication Exchange	51
E.5	Capabilities Exchange	52
Annex F (informative): Billing Format Conversion.....		54
Annex G (informative): XML Overview.....		58
G.1	Document Definition.....	58
G.2	Element Declaration.....	58
G.3	Attribute Declaration.....	59
Annex H (informative): Binary XML Content Format for OSP.....		60
H.1	Global Extension Tokens	61
H.2	Example Application.....	63

H.2.1	Standard XML Format (505 bytes)	63
H.2.2	Binary XML Content Format (160 bytes)	63
Annex I (normative): PICS proforma for OSP (TS 101 321) v2.1.1.....		64
I.1	Guidance for completing the PICS proforma	64
I.1.1	Purposes and structure	64
I.1.2	Abbreviations and conventions	64
I.1.3	Instructions for completing the PICS proforma.....	66
I.2	Identification of the implementation	66
I.2.1	Date of the statement	66
I.2.2	Implementation Under Test (IUT) identification	67
I.2.3	System Under Test (SUT) identification	67
I.2.4	Product supplier.....	67
I.2.5	Client (if different from product supplier).....	68
I.2.6	PICS contact person	68
I.3	PICS	69
I.3.1	Identification of the protocol	69
I.3.2	Global Statement of Conformance	69
I.3.3	Roles.....	69
I.3.4	Major capabilities	69
I.3.5	Secure Socket Layer Security Capabilities.....	70
I.3.6	Hypertext Transfer Protocol Capabilities	70
I.3.7	Multipurpose Internet Mail Extensions Capabilities	72
I.3.8	Extensible Markup Language Capabilities.....	72
I.3.9	Root Message Capabilities	73
I.3.10	Message support	74
I.3.11	Authorization Token Support	77
I.3.12	XML Extensions	82
Annex J (informative): OSP Applications and Implementations.....		83
J.1	Call Control Protocols	83
J.1.1	Peer-to-Peer Architecture	83
J.1.1.1	H.323 Gateways.....	83
J.1.1.1.1	Call Routing and Authorization	84
J.1.1.1.2	Usage Reports	86
J.1.1.2	Session Initiation Protocol Gateways	87
J.1.1.2.1	Call Routing and Authorization	88
J.1.1.2.2	Usage Reports	90
J.1.2	Tightly Controlled Distributed Architecture	91
J.1.2.1	H.323 Gatekeeper Routed Calls.....	92
J.1.2.1.1	Call Routing and Authorization	92
J.1.2.1.2	Usage Reports	94
J.1.2.2	Session Initiation Protocol Proxy Servers.....	95
J.1.2.2.1	Call Routing and Authorization	96
J.1.2.2.2	Usage Reports	98
J.1.3	Loosely Controlled Distributed Architecture	99
J.1.3.1	H.323 Direct Routed Calls (with Gatekeepers).....	100
J.1.3.1.1	Call Routing and Authorization	100
J.1.3.1.2	Usage Reports	102
J.1.3.2	Session Initiation Protocol Redirect Servers.....	104
J.1.3.2.1	Call Routing and Authorization	105
J.1.3.2.2	Usage Reports	107
J.2	Prepaid Calling Card and Roaming User Support.....	110
J.2.1	Call Routing and Authorization.....	111
J.2.2	Reauthorization	112
Bibliography		116
History		117

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Foreword

This Technical Specification (TS) has been produced by ETSI Project Telecommunications and Internet Protocol Harmonization Over Networks (TIPHON).

Introduction

The contents of the present document are the result of contributions and discussions in Working Group 3.

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1 Scope

The present document shall be called the Open Settlement Protocol (OSP). The present document specifies a set of protocols and associated profiles to permit the exchange of inter-domain pricing, authorization, and settlement information between internet telephony operators. The protocols specified fulfil the essential requirements of such services, by providing appropriate functionality between multiple administrative domains in a secure manner. The specification also provides for non-standard extensions that permit co-operating parties to augment or replace the basic functionality.

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies.
- A non-specific reference to an ETS shall also be taken to refer to later versions published as an EN with the same number.

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3 Abbreviations

For the purposes of the present document, the following abbreviations apply:

CMS	Cryptographic Message Syntax
DES	Data Encryption Standard
DSA	Digital Signature Algorithm
DTD	Document Type Definition
HTML	Hypertext Markup Language
HTTP	Hypertext Transfer Protocol
IETF	Internet Engineering Task Force
IP	Internet Protocol
IPSEC	Internet Protocol Security
MD5	Message Digest 5
MIME	Multipurpose Internet Mail Extensions
OSP	Open Settlement Protocol
PIN	Personal Identification Number (e.g. for automated teller machines)
PKCS	Public Key Cryptography Standard

RAS	Registration Admission and Status
RSA	Rivest Shamir Adleman
SHA	Secure Hash Algorithm
S/MIME	Secure Multipurpose Internet Mail Extensions
SSL	Secure Socket Layer
TCP	Transmission Control Protocol
TLS	Transport Layer Security
URL	Uniform Resource Locator
UTC	Universal Time Co-ordinated
UTF	Universal Text Format
XML	Extensible Markup Language

4 Open Settlement Protocol Architecture

This clause introduces the protocol architecture for the OSP specification. It identifies the major protocols used by communicating parties, and it outlines their relationship to each other. The clause also describes the overall format of messages exchanged by the protocols. The intent of this clause is to outline the framework for the standard's protocols and message formats; later clauses detail specific profiles for these protocols and the specific message content.

4.1 Communication Protocols

As figure 1 shows, systems conforming to the OSP specification use a combination of the Hypertext Transfer Protocol (HTTP), and either the Secure Sockets Layer (SSL) or Transport Layer Security (TLS) to transfer pricing, authorization, and usage information. As the figure indicates, these protocols are layered on top of the Transmission Control Protocol (TCP) for communication across Internet Protocol (IP) networks.

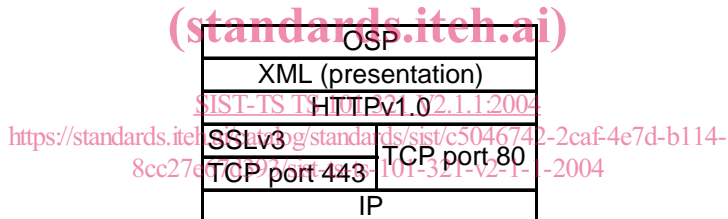


Figure 1: Open Settlement Protocol Architecture for Pricing, Authorization, and Usage Exchange

4.1.1 Secure Sockets Layer/Transport Layer Security

The Secure Sockets Layer and Transport Layer Security protocols add authentication and privacy to TCP connections. SSL is the standard protocol for securing web browsing. As such, it is widely deployed on the Internet and is distinguished by considerable operational experience. SSL also enjoys near universal support from firewalls and proxy servers. TLS is an updated version of SSL currently being developed within the Internet Engineering Task Force (IETF). TLS is heavily based on SSL and, although it is not strictly backwards compatible with SSL, systems supporting both TLS and SSL can automatically recognize either protocol and adapt as required to ensure interoperability.

NOTE: As other industry standard mechanisms for IP-based security (for example, IPSEC) reach maturity, later revisions to the present document may incorporate support for those mechanisms in addition to SSL/TLS. Such revisions to the security mechanisms may also permit the use of an unreliable transport such as UDP.

4.1.2 Hypertext Transfer Protocol

The Hypertext Transfer Protocol (HTTP) is the standard protocol for web-based communications. HTTP has been adopted for a wide variety of purposes including proxy services, bi-directional content delivery, database access, network management, and metering information. HTTP is by far the most widely used application protocol on the Internet, and is supported by all significant firewalls and proxy servers.

4.2 Message Format

To illustrate the overall format of OSP messages, figure 2 shows an example message. As the figure indicates, the content within the HTTP message is formatted according to the standard for Multipurpose Internet Mail Extensions (MIME). The individual components of the message are a document conforming to the Extensible Markup Language (XML) specification and a Secure MIME (S/MIME) digital signature.

NOTE: The digital signature is optional and, if omitted, the message content consists solely of a XML document.

HTTP Header	<pre>POST scripts/settlements HTTP/1.0 content-type: multipart/signed; protocol="application/pkcs7-signature"; micalg=shal; boundary=bar content-length: 844</pre>
Message Content	<pre>--bar Content-Type: text/plain Content-Length: 524 <?xml version='1.0'?> <Message messageId="123454321" random="12345678"> <AuthorizationRequest componentId="9876567890"> <Timestamp> 1998-04-24T17:03:00Z </Timestamp> <CallId> 1234432198766789 </CallId> <SourceInfo type="e164"> 81458811202 </SourceInfo> <DestinationInfo type="e164"> 4766841360 </DestinationInfo> <Service/> <MaximumDestinations> 5 </MaximumDestinations> </AuthorizationRequest> </Message></pre>
Digital Signature	<pre>--bar Content-Type: application/pkcs7-signature Content-Length: 191 GhyHhHUuJhJh77n8HHGTrfvbnj756tbB9HG4VQpfyF467GhIG fHfYT64VQpfyF467GhIGfHfYT6jH77n8HHGghyHhHUuJhJh756t bB9HGTrfvbnjn8HHGTrfvhJh776tbB9HG4VQbnj7567GhIGfH fYT6ghyHhHUujpfyF47GhIGfHfYT64VQbnj756 --bar--</pre>

Figure 2: Example Message Showing Overall Format

4.2.1 Multipurpose Internet Mail Extensions

All messages exchanged as part of this OSP specification conform to the Multipurpose Internet Mail Extensions (MIME) specification. The MIME specification defines mechanisms to combine individual components of arbitrary format (e.g. text, graphics, audio information, binary data, etc.) into a single message. Originally designed for electronic mail, the MIME specification has been adapted for a variety of communication applications, including web browsing. MIME format is widely supported by existing firewalls and proxy servers.

4.2.2 Extensible Markup Language

The first part of each MIME message is a document conforming to the Extensible Markup Language (XML) standard. As an extension of the widely deployed Hypertext Markup Language (HTML), XML can be readily parsed by firewalls and proxy servers. Unlike HTML, though, XML is readily extensible and can easily support rich, structured data such as pricing and usage information.

4.2.3 Secure MIME

The second part of each MIME message, if present, is a digital signature conforming to the Secure Multipurpose Internet Mail Extensions (S/MIME). S/MIME format includes support for multiple digest and signing algorithms and for variable cryptographic strength (e.g. key lengths). S/MIME format is also self-identifying with respect to these parameters, so that a recipient can derive the necessary information for verifying the signature from the signature data.

NOTE: This does not imply that the recipient is guaranteed to be able to verify the signature, only that the recipient can tell what it needs to perform the verification. (So that, for example, the recipient may identify a signing algorithm that it does not support).

5 Protocol Profiles

This clause specifies the profiles for the protocols required by this OSP specification. It identifies the normative references to those protocols, as well as the specific versions, options, and extensions that the present document requires. The specific protocols described in this clause are the Secure Sockets Layer (SSL) and Transport Layer (TLS) protocols and the Hypertext Transfer Protocol (HTTP). The clause concludes by specifying the overall format of the messages conveyed through these protocols. The following clauses describe the message content in detail.

5.1 Secure Sockets Layer/Transport Layer Security

If secure authentication of the server is desired, or if confidentiality of the information exchanged between client and server is desired, the communication between the devices shall be secured using the Secure Sockets Layer (SSL) or Transport Layer Security (TLS) as described in this clause.

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5.1.1 Protocol Version (standards.iteh.ai)

Conforming systems shall support version 3.0 of the Secure Sockets Layer protocol [6] to secure their communications.

NOTE: As an implementation option, systems may support version 1.0 of the Transport Layer Security protocol [24] or later versions.

5.1.2 Client/Server Roles

When initiating a communication as part of the present document, the initiating system shall act as an SSL/TLS client while the responding system shall act as an SSL/TLS server.

5.1.3 CipherSuites

Annex B documents the cryptographic algorithms required and recommended by the present document, including SSL/TLS ciphersuites.

5.2 Hypertext Transfer Protocol

5.2.1 Protocol Version

Conforming systems shall support version 1.0 of the Hypertext Transfer Protocol [2] as the base transfer protocol for their messages.

NOTE: As an implementation option, systems may support HTTP version 1.1 [4].

5.2.2 Client/Server Roles

When initiating a communication as part of the present document, the initiating system shall act as an HTTP client, while the responding system shall act as an HTTP server.

5.2.3 TCP Port

Clients shall support sending their requests to TCP port 443 if SSL/TLS is being used, and to TCP port 80 otherwise. As an implementation option, communicating parties may agree to communicate via other TCP ports.

5.2.4 HTTP Methods

Requests from clients to a server shall be in the form of HTTP request messages using the POST method. Responses from a server shall consist of valid HTTP response messages.

5.2.5 Uniform Resource Identifier

The uniform resource identifier included in the POST request is not specified in the present document, but rather is subject to prior agreement between the communicating parties.

5.2.6 HTTP Headers

The HTTP header of the POST method shall minimally consist of the request-line. All request-header and general-header fields are optional. If present, they shall conform to the HTTP standard [2]. The status-line for the HTTP responses shall be present in those responses, and it shall conform to the HTTP standard, including status-code and reason-phrase values. All response-header and general-header fields are optional. If present, they shall conform to the HTTP standard.

5.2.7 HTTP Entity Body

Each message (i.e. HTTP entity body) conveyed as part of the present document shall conform to the Multipurpose Internet Mail Extensions standard [5], and shall, if signed, consist of exactly two parts, an Extensible Markup Language document and a Secure Multipurpose Internet Mail Extensions digital signature, as specified in the following two clauses. The highest level structure for each message shall conform to the multipart/signed syntax defined in S/MIME [18]. The message's media type shall be "multipart/signed" with appropriate parameters (e.g. protocol of "application/pkcs7-signature" and "mimealg=sha1"). The entity shall indicate the correct content-length value, as defined in the HTTP standard [2].

If not signed, each message shall simply consist of a single, text/plain part.

6 XML Content

This clause specifies the actual message format used by the OSP to exchange pricing, authentication and authorization, and usage information. It outlines the overall XML document structure, lists the individual XML elements, and describes how those elements are combined into exchanges.

6.1 Document Structure

6.1.1 Multipurpose Internet Mail Extensions Conformance

As the first part of a Multipurpose Internet Mail Extensions (MIME) message, each message content shall conform to the MIME standard [5] as indicated below.

6.1.1.1 Content-Type

The message's content-type shall be designated text/plain.

NOTE: It is anticipated that the Internet Engineering Task Force (IETF) will eventually define a MIME content-type for XML documents (e.g. text/xml). When such a definition is available, subsequent revisions of the present document may specify the use of that content-type instead of text/plain.