Architecture of the Environment using the Standard Transcoding Interface

Approved Version 1.0 – 15 May 2007

Open Mobile Alliance
OMA-AD-STI-V1_0-20070515-A

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1. Scope (Informative)

The scope of OMA Standard Transcoding Interface (STI) is to provide a standardized interface between Multimedia Application Platforms and a Transcoding Platform to allow transcoding of media Content files based on Application specified transcoding parameters and/or User Equipment capabilities.

The activity started as a request from some Mobile Network Operators that are OMA members, requesting that an interface for transcoding be standardized. One of the first targeted implementations of this interface is between the MMSC and a Transcoding Platform. Note however that the work of STI is not limited to an interface between the MMSC and a Transcoding Platform; it is the goal to be generic enough to allow other applications such as browsing, media download services, push services, etc to also make use of such an interface.

The notion of "Content adaptation" or "transcoding" in this document refers to the transformation and manipulation of Content (images, audio, video, text, presentation, etc.) to meet the desired targets (defined by the User Equipment capabilities and/or the application needs).

Since STI is an interface and not a node per se, the architecture presented here is not the architecture of the interface nor is it the architecture of the Transcoding Platform. It is a document describing a network architecture in which certain nodes use the STI interface; basically the Architecture of the Environment using the Standard Transcoding Interface.

This document is part of the OMA STI version 1.0 specification suite.

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2. References

2.1 Normative References

No normative references.

2.2 Informative References

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URL: http://www.openmobilealliance.org/

[ARCH-PRINC] "OMA Architecture Principles", Open Mobile Alliance™,
URL: http://www.openmobilealliance.org/

[ARCH-REVIEW] "OMA Architecture Review Process", Open Mobile Alliance™,
URL: http://www.openmobilealliance.org/

[CCPPex] "CC/PP exchange protocol based on HTTP Extension Framework", H. Ohto, J. Hjelm, June 1999. URL: http://www.w3.org/TR/NOTE-CCPPexchange

[OMA-DICT] "OMA Dictionary", Open Mobile Alliance™,
URL: http://www.openmobilealliance.org/

[OWSER Core Spec] "OMA Web Services Enabler, Core Specifications, Candidate Version 1.0 – 20 June 2004", Open Mobile Alliance™, URL: http://www.openmobilealliance.org/

[RFC2119] "Key words for use in RFCs to Indicate Requirement Levels". S. Bradner. March 1997.
URL: http://www.ietf.org/rfc/rfc2119.txt

[STI RD] "STI Requirements", Open Mobile Alliance™,
URL: http://www.openmobilealliance.org/

[STI SPEC] "STI 1.0 Specifications", Open Mobile Alliance™, URL: http://www.openmobilealliance.org/

[STI XSD] "STI 1.0 XML Schema", Open Mobile Alliance™, URL: http://www.openmobilealliance.org/

[UAPROF] "OMA-WAP-UAProf-v1_1-20021212-c", Open Mobile Alliance™,
URL: http://www.openmobilealliance.org/

[XML SCHEMA] W3C XML Schema 1.0 Overview
URL: http://www.w3.org/XML/Schema

[XML SCHEMA 0] W3C XML Schema Part 0:Primer
URL: http://www.w3.org/TR/xmlschema-0/

[XML SCHEMA 1] W3C XML Schema Part 1:Structures
URL: http://www.w3.org/TR/2001/REC-xmlschema-1-20010502/

[XML SCHEMA 2] W3C XML Schema Part 1:Datatypes
URL: http://www.w3.org/TR/2001/REC-xmlschema-2-20010502/

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3. Terminology and Conventions

3.1 Conventions

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 [**Error! Reference source not found.**].

All sections and appendixes, except “Scope” and “Introduction”, are normative, unless they are explicitly indicated to be informative.

This is an informative document, which is not intended to provide testable requirements to implementations.

3.2 Definitions

Application Platform	Combination of hardware and software that provide the functionality of an application. Note that rather than implementing all components to provide the functionality of an application, the implementation can integrate the necessary components from other platforms.
Application Policies	A list of rules or recommended limits that should be applied by the Transcoding Platform. Policies represent behaviors of the Transcoding Platform and are out of the scope for STI 1.0. Only a reference (URI) to external policies information is standardized in STI 1.0. This means that a set of policies may be referenced in a transcoding request coming from an Application Platform. The Transcoding Platform should then take into consideration the referenced policies.
Content	Subject matter or information that is processed, stored, or transmitted electronically. It includes such things as text, presentation, audio, images, video, etc. Content may have properties such as media type, mime type, etc.
Content Adaptation	The transformation and manipulation of Content (images, audio, video, text, presentation…etc.) to meet the desired targets (defined by the terminal capabilities and the application needs). Those adaptations include: media format transcoding, scaling, re-sampling, file size compression…etc.
Interface	See [OMA-DICT].
Profile	Set of User Equipment characteristics and capabilities, and possibly some additional specific parameters such as advanced transcoding parameters.
Reference DB or Server	A database or server that can contain detailed transcoding profiles for specific User Equipment, and Application policies, which can be referenced in a request, and fetched by the Transcoding Platform. The various information is not necessarily in the same physical or logical database or server.
Reference Point	See [OMA-DICT].
Remote Content Database or Server	A remote server, database or some kind of storage system where multimedia files (content) are stored. Such multimedia files may be referenced in a transcoding request
System	A functional entity
Transcoding	Same as “Content Adaptation”, used interchangeably in the document.
Transcoding Platform	Combination of hardware and software that provide transcoding functionality.
Transcoding Service	System that provides transcoding of Content as a service to the end user. Note that such systems can also include functionality beside the transcoding such as charging, encryption and so on.
User Equipment	A device allowing a user access to network services. For the purpose of OMA specifications the interface between the UE and the network is the radio interface
User Equipment	A list of characteristics describing a User Equipment: screen size, codecs supported etc. This can be

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Capabilities	packaged in a “profile”.

3.3 Abbreviations

AD	Architecture Document
ASP	Application Service Provider
CCPP	Composite Capabilities/ Preferences Profile
CPI	Capability and Preference Information
CPU	Central Processing Unit
FTP	File Transfer Protocol
GIF	Graphics Interchange Format
HTTP	HyperText Transfer Protocol
HTTPS	Secured HTTP
JPEG	Joint Photographic Experts Group
MM	Multimedia Message
MMS	Multimedia Messaging Service
MMSC	Multimedia Messaging Service Center
MPEG	Moving Picture Experts Group
OMA	Open Mobile Alliance
RFC	Request For Comments
RP	Reference Point
SOAP	Simple Object Access Protocol
STI	Standard Transcoding Interface
UAProf	User Agent Profile
URI	Uniform Resource Identifier
URL	Uniform Resource Locator
WAP	Wireless Application Protocol
XML	eXtensible Markup Language

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4. Introduction (Informative)

The Standard Transcoding Interface, as its name implies, is intended to provide a standardized way for applications to request content adaptation of multimedia files from a Transcoding Platform. It is important that content be adapted to the specific capabilities of the User Equipment and to policies provided by the service providers in order to provide a better end user multimedia experience.

The Standard Transcoding Interface will allow service providers to

- use a single logical Transcoding Platform for various applications within their network
- choose their Transcoding Platform provider, i.e. applications no longer have to be tied to specific Transcoding Platforms with proprietary interfaces

In the context of the reference points of the inventories of OMA architectures [ARCH-INVENT], the Application Platforms are "Requesting Applications" and the Transcoding Platform is a new node in the OMA architecture. STI defines three reference points:

- TI-1: Transcoding interface
- TI-2 and TI-3: Access to remote content stored in databases or servers
- TI-4 and TI-5: Access to reference databases or servers

More details on these reference points can be found in section 5.3.2.

4.1 Target Audience

The target audience for this document includes but is not limited to the following:

- STI Working Group to develop the STI specification.
- MMSG Working Group for the MMSC acting as a requesting application using the STI interface.
- Architecture Working Group (during Architecture Reviews as defined in [ARCH-REVIEW], to determine compliance of [ARCH-PRINC], etc.).
- Interoperability Working Group (for early analysis of interoperability requirements).
- Security Working Group.

4.2 Use Cases

The following lists the Use Cases supported by the STI environment. Those use cases refer to situations where content adaptation is required and Application Platforms would benefit from using a single standardized interface to request content transcoding. STI offers a standard interface for an Application Platform to request and describe the transcoding operations to be performed on multimedia content by a Transcoding Platform. For more details on the Use Cases, please refer to the STI Requirements document [STI RD].

- Person-to-person MMS (various scenarios)
- Application to Person Messaging
- MMS to email transcoding
- Browsing
- Peer Content Distribution

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- Transcoding Preferences and Policies
- Operator with Multiple Services
- Photo Album – Application Generated Policies
- Photo Album – Concatenation of Files
- Applications with different time constraints

From the point of view of STI, the following actors and functional entities or system elements have been identified in the STI environment architecture:

- Application Platform

  The Application Platform is the combination of hardware and software that provide the functionality of an application. Examples of Application Platforms are the MMSC (Messaging Server) or the portal of an Application Service Provider (ASP).

- Transcoding Platform

  The Transcoding Platform is the combination of hardware and software that provide transcoding functionality.

- Content Provider

  The Content Provider is the creator and/or owner of actual multimedia Content.

- End-User

  A user is the human user of the multimedia-capable equipment.

- End-User Equipment

  A device allowing a user access to network services.

- Remote Content

  This can be used in cases where multimedia files (content) are referenced in a transcoding request, and the Transcoding Platform needs to fetch them from a remote server, database or some kind of storage system.

- Reference Database or Server

  This database or server can contain User Equipment capabilities and Application policies, which can be referenced in a request, and fetched by the Transcoding Platform. The various information is not necessarily in the same physical or logical database or server.

- Application Policies

  A list of rules or recommended limits that should be applied by the Transcoding Platform. Policies represent behaviors of the Transcoding Platform and are out of the scope for STI 1.0. Only a reference (URI) to external policies information is standardized in STI 1.0. This means that a set of policies may be referenced in a transcoding request coming from an Application Platform. The Transcoding Platform should then take into consideration the referenced policies.

4.2.1 Example Use Cases

The following example use cases illustrate a few of the real life applications in which STI may be used. It is not an exhaustive list.

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4.2.1.1 Person to Person Messaging

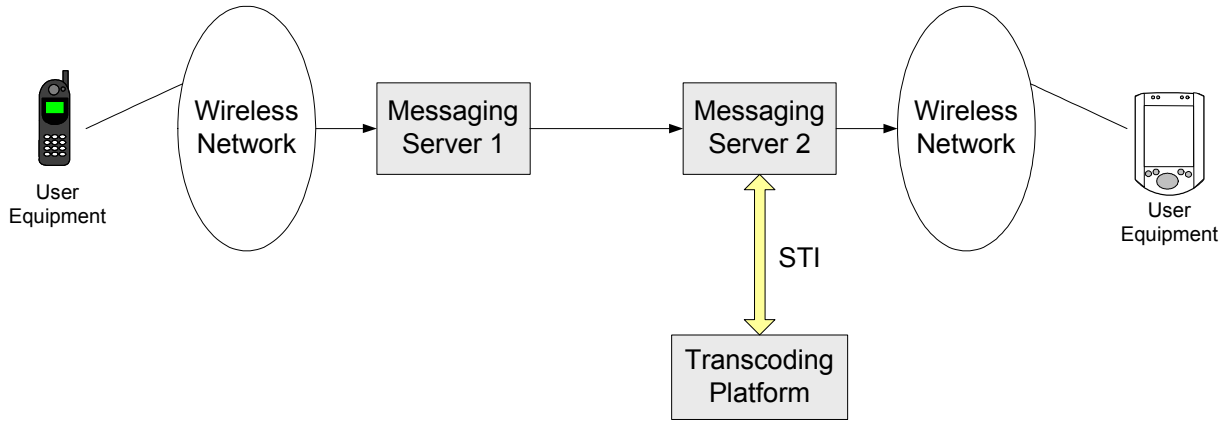

Figure 1 – Person to Person Messaging

An end-user creates an MM and wants to send it to a friend in another wireless network. When the Messaging Server of the recipient end-user receives the MM, content adaptation may be needed for some or all parts of the MM based on the recipient User Equipment capabilities. The Messaging Server (Application Platform) can request that transcoding be performed by the Transcoding Platform before it is delivered to the recipient.

4.2.1.2 Application to Person Messaging

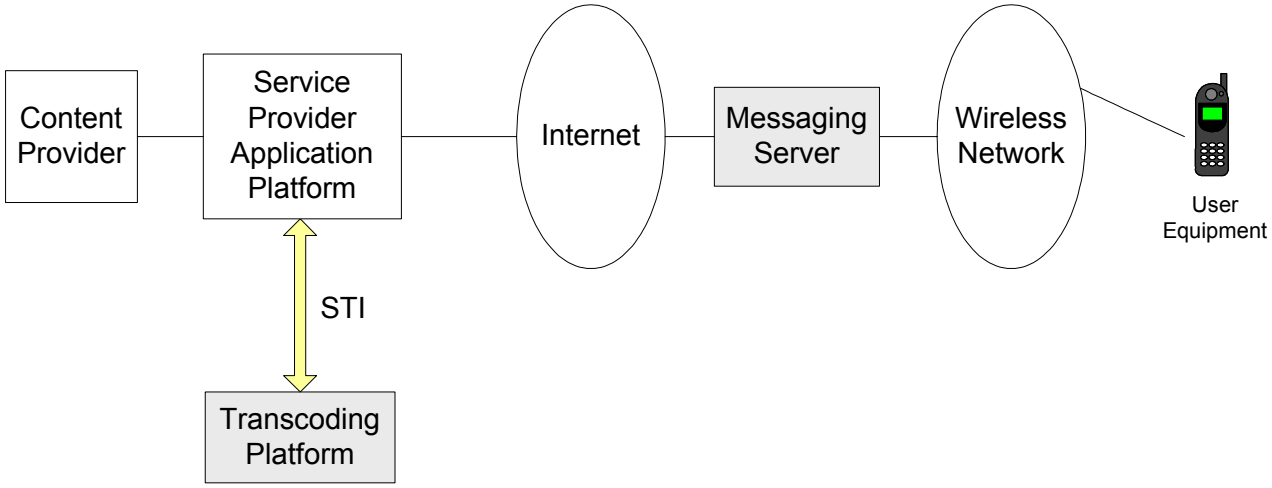

Figure 2– Application to Person Messaging

In this scenario, a Service Provider can provide multimedia services such as weather report and news created by a Content Provider. End-users can subscribe to such services by accessing the web site or portal of the service provider. Based on the User Equipment capabilities of the end-user, the Service Provider Application Platform may request content adaptation to the Transcoding Platform.

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4.2.1.3 End-user using Transcoding Service

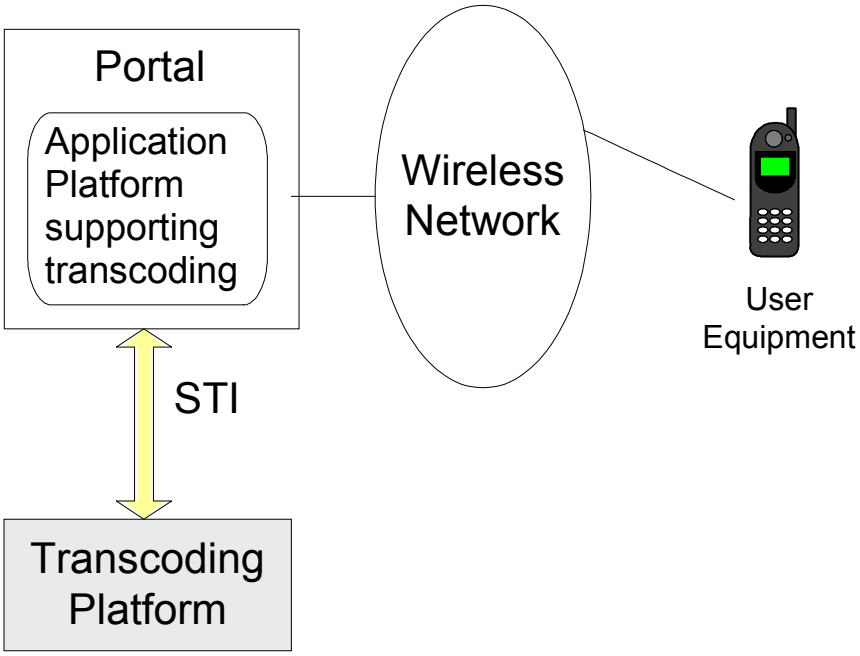

Figure 3 – Transcoding Service

This scenario shows an example of an end-user accessing an Application Platform supporting Transcoding Services. The Transcoding Services may be available through the portal of a wireless operator for example. The end-user received a ring-tone using a Bluetooth or infrared connection. The ring tone is not suitable for the end-user's User Equipment. The end-user utilizes the Transcoding Service to convert the ring tone to a suitable format. STI is used by the Application Platform to request the necessary transcoding from the Transcoding Platform.

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4.2.1.4 Multiple Applications using a single Transcoding Platform

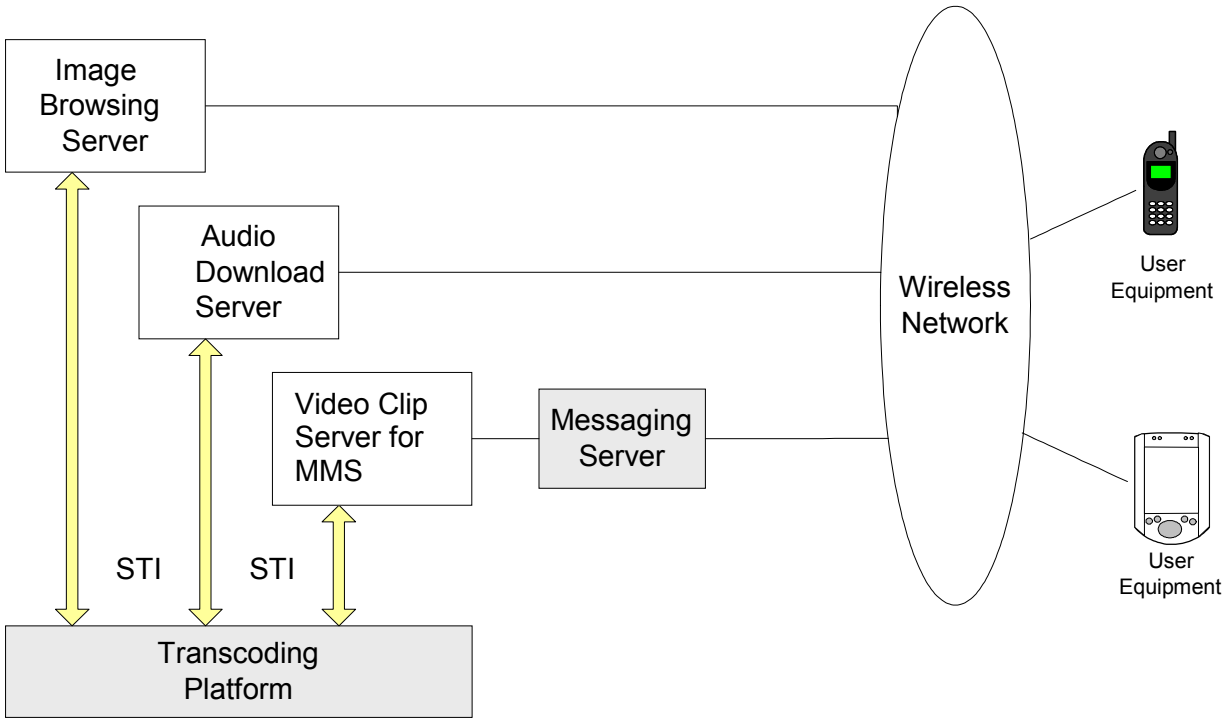

Figure 4 – Multiple Applications, Single Transcoding Platform

This scenario shows a Transcoding Platform being used by several Application Platforms. An operator can deploy several multimedia services: for example, image browsing, audio download, and Video clips over MMS. The STI allows the operator to pick the transcoding provider independent of the Application Platform providers and at the same time allows for several multimedia services to share the same Transcoding Platform. This may reduce the amount of required resources (e.g. number of CPUs, storage, etc).

4.3 Requirements

This environment architecture is based on the requirements listed and described in the STI Requirements document [STI RD].

The following table contains all the requirements, the phase in which they are met, and the section(s) in this document where they are covered.

Requirement ID/Number	Phase Met	Section(s)/Comments
6.1.1 bullet #1	1.0	5.1, 5.3.1, 5.3.2
6.1.1 bullet #2	1.0	5.1, 5.3.1, 5.3.2
6.1.1 bullet #3	1.0	5.1, 5.3.1, 5.3.2
6.1.1 bullet #4	None	N/A – not a requirement on STI
6.1.1 bullet #5	None	N/A – not a requirement on STI
6.1.1 bullet #6	None	N/A – not a requirement on STI
6.1.2 paragraph #1	1.0	5.1, 5.3.1. Part of TI-1 RP, parameters passed from Transcoding Platform to Application Platform in response to transcoding request.
6.1.2 bullet #1	None	N/A – not a requirement on STI
6.1.2 bullet #2	None	N/A – not a requirement on STI

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Requirement ID/Number	Phase Met	Section(s)/Comments
6.1.3 bullet #1	None	N/A – not a requirement on STI
6.1.3 bullet #2	None	N/A – not a requirement on STI
6.1.3 bullet #3	None	N/A – not a requirement on STI
6.1.3 bullet #4		Service Discovery – will not be included in STI 1.0.
6.1.4 bullet #1	1.0	Not addressed in AD – If privacy of information passed between the Application Platform and the Transcoding Platform is needed, HTTPS will be used between the nodes, as specified in sections 5.3.1 and 5.3.2.
6.2.1 bullet #1	1.0	4, 4.2, 5.1, 5.2
6.2.2 bullet #1	1.0	4, 4.2, 5.1, 5.2
6.2.2 bullet #2	1.0	4, 4.2, 5.1, 5.2
6.2.2 bullet #3	1.0	4, 4.2, 5.1, 5.2
6.2.2 bullet #4	1.0	4, 4.2, 5.1, 5.2
6.2.3 bullet #1	1.0	Complete section 5
6.2.3 bullet #2	1.0	Not applicable, first version
6.2.3 bullet #3	1.0	Supported with parameters in the STI specification. Not addressed specifically in the AD.
6.2.3 bullet #4	1.0	Complete section 5
6.3.1 bullet #1	1.0	5
6.3.1 bullet #2	1.0	5
6.3.2 bullet #1	1.0	5
6.3.2 bullet #2	1.0	5
6.3.2 bullet #3	1.0	Supported when needed, not addressed in AD
6.3.2 bullet #4	1.0	Specific parameters and policies applicable to specific media types are detailed in the specification. 5
6.3.2 bullet #5	1.0	Not supported in STI 1.0
6.3.2 bullet #6	1.0	Standard definition of transcoding parameters and provision for some proprietary parameters.
6.3.3 bullet #1	1.0	5
6.3.3 bullet #2	1.0	Supported when needed, not addressed specifically in AD
6.3.3 bullet #3	1.0	Supported when needed, not addressed specifically in AD
6.3.4 bullet #1	1.0	5.2
6.3.4 bullet #2	1.0	5.3.2.1
6.3.5 bullet #1	1.0	5
6.3.5 bullet #2	1.0	5
6.3.5 bullet #3	1.0	5 indirectly. Same applies to multipart as to single media file, i.e. transcoding parameters can be included in request and/or a reference to User Equipment capabilities can be included.
6.3.5 bullet #4	1.0	5 indirectly. Same applies to multipart as to single media file, i.e. transcoding parameters can be included in request and/or a reference to User Equipment capabilities can be included.
6.4.1 bullet #1	1.0	5
6.4.1 bullet #2	1.0	5
6.4.2 bullet #1	1.0	5
6.4.2 bullet #2	1.0	5

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Requirement ID/Number	Phase Met	Section(s)/Comments
6.4.2 bullet #3	1.0	5
6.4.3 bullet #1	1.0	5
6.4.3 bullet #2	1.0	5
6.5.1 bullet #1	1.0	5.3.2.1
6.5.1 bullet #2	1.0	5.3.2.1
6.5.1 bullet #3	1.0	Supported with parameters in the STI specification. Not addressed specifically in the AD.
6.5.2 bullet #1	1.0	Supported, not addressed in AD, but in specification
6.5.2 bullet #2	1.0	Supported, not addressed in AD, but in specification
6.5.2 bullet #3	1.0	Supported, not addressed in AD, but in specification
6.5.2 bullet #4	1.0	Supported, not addressed in AD, but in specification
6.5.2 bullet #5	1.0	Supported, not addressed in AD, but in specification
6.5.3 bullet #1	1.0	Supported, not addressed in AD, but in specification
6.5.3 bullet #2	1.0	Supported, not addressed in AD, but in specification
6.5.3 bullet #3	1.0	Supported, not addressed in AD, but in specification
6.5.3 bullet #4	1.0	Supported, not addressed in AD, but in specification
6.5.4 bullet #1	1.0	Supported, not addressed in AD, but in specification
6.5.4 bullet #2	1.0	Supported, not addressed in AD, but in specification
6.5.4 bullet #3	1.0	Supported, not addressed in AD, but in specification
6.5.4 bullet #4	1.0	Supported, not addressed in AD, but in specification
6.5.4 bullet #5	1.0	Supported, not addressed in AD, but in specification
6.6.1 bullet #1	None	N/A – not a requirement on STI
6.6.1 bullet #2	None	N/A – not a requirement on STI
6.6.1 bullet #3	None	N/A – not a requirement on STI
6.6.1 bullet #4	None	N/A – not a requirement on STI
6.6.1 bullet #5	None	N/A – not a requirement on STI
6.6.1 bullet #6	None	N/A – not a requirement on STI
6.6.2 bullet #1	None	N/A – not a requirement on STI
6.6.2 bullet #2	None	N/A – not a requirement on STI
6.6.2 bullet #3	None	N/A – not a requirement on STI
6.6.2 bullet #4	None	N/A – not a requirement on STI
6.6.2 bullet #5	None	N/A – not a requirement on STI
6.6.2 bullet #6	None	N/A – not a requirement on STI
6.6.2 bullet #7	None	N/A – not a requirement on STI
6.6.2 bullet #8	None	N/A – not a requirement on STI
6.6.2 bullet #9	None	N/A – not a requirement on STI
6.6.3 bullet #1	1.0	Included in all STI requirements

4.4 Planned Phases

This environment architecture is within the first phase of the Standard Transcoding Interface work. The specification to be derived from this environment architecture is STI 1.0.

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5. Architectural Model

5.1 Environment

STI provides a standardized interface for Application Platforms to send transcoding requests to a Transcoding Platform and all related actions required to achieve that goal (e.g. access remote content, access a User Equipment capability database, etc.). Transcoding means content adaptation, for example changing the format of an image from GIF to JPEG. The Transcoding Service itself is provided by the Transcoding Platform. But this architecture and specification are not those of the Transcoding Platform but rather of the architecture of the networked environment using STI. For instance it describes the linking between the Application Platforms and the Transcoding Platform.

At its most generic implementation, the interface sits between an Application Platform and a Transcoding Platform as shown in Figure 5. A reference database/server and remote content database/server are also part of the network environment. The Application Platform, as described in the earlier use cases, can be any Application Platform requiring adaptation services: messaging server, a Service Provider Application Platform, a portal supporting transcoding, an image browsing server, an audio download server, a video clip server for MMS, etc.

Only the TI interfaces are within the scope of STI (yellow arrows in Figure 5). The grey arrows are in Figure 5 for information purposes only and are out of the scope of STI.

Section 5.3.2 provides more information on the STI reference points.

STI uses a "request-response" model, described in 5.2, for the Application Platform to request transcoding to be performed by the Transcoding Platform. The Transcoding Platform responds to the request with the appropriate response, e.g. the transcoded result.

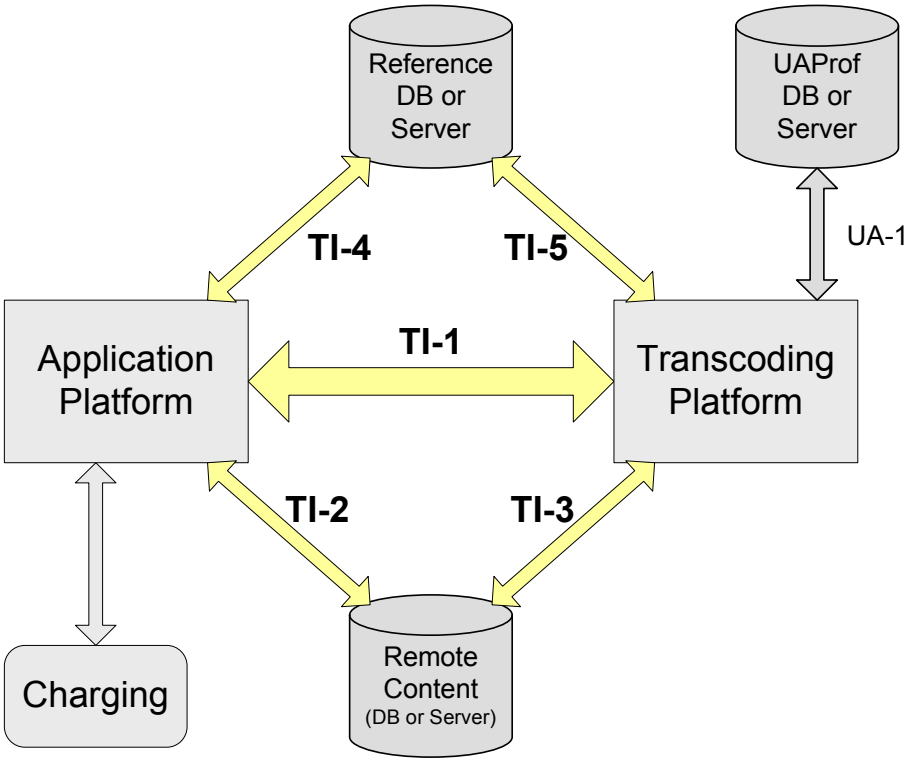

Figure 5 – Architecture of the Environment using STI with STI Reference Points.

The Application Platform is the combination of hardware and software that provide the functionality of an application or another enabler. Examples of Application Platforms are the MMSC, the portal of an Application Service Provider (ASP), a download server, etc.

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The Transcoding Platform is the combination of hardware and software that provide transcoding functionality.

The Application Platform and the Transcoding Platform can share the same physical machine, but are still different logical entities using STI as the interface.

The multimedia elements (content) may be referenced in a transcoding request or included in the actual request, which means that the Transcoding Platform may have to fetch the content from an external database or server (Remote Content in Figure 5). The Application Platform may accordingly have to fetch the result from an external database or server.

The reference database or server may contain detailed transcoding profiles for specific User Equipment as well as application policies. The Application Platform may include the output formats and characteristics (i.e. the detailed transcoding parameters) in the transcoding request and/or include a reference to User Equipment information (e.g. handset profile reference). The Transcoding Platform may use the handset profile reference to retrieve the detailed transcoding profile from the reference database/server or from an internal database, and/or retrieve the basic User Equipment capabilities from a UAProf database/server. The Transcoding Platform shall use the UA-1 reference point for interfacing to a UAProf database/server.

The resulting User Equipment capabilities and/or transcoding parameters are then used by the Transcoding Platform to perform the content adaptation that is best suited for the specific User Equipment and the Application requirements.

In the response, in addition to the transcoded content, the Transcoding Platform will return information such as a return code, total duration (for transcoding), and file size. How the Application Platform uses this additional information (if at all) is out of the scope of this specification.

The Transcoding Platform is also responsible for reporting (or returning) errors and warnings to the requesting Application Platform. The errors can be attributed to an erroneous transcoding request or the inability for the Transcoding Platform to perform the requested transcoding.

5.1.1 Security

As can be seen in section 5.3.1 and 5.3.2, HTTPS can be used when transfer of information between the Application Platform and the Transcoding Platform needs to be secured, as per the recommendation from the OMA SEC group.

5.1.2 Charging

It is understood that the various nodes such as the Application Platforms and the Transcoding Platform can be within the same network (i.e. trusted nodes) or in different networks (untrusted nodes), however STI 1.0 does not include any specific charging parameters such as money amount, etc. In STI 1.0, the Transcoding Platform will however return basic information such as operation ID, return code, total duration, and file size which can be used by the requesting application to perform rating and charging operations.

If more advanced charging and rating functionality is later added in a subsequent version of STI, the work from the Mobile Commerce and Charging (MCC) group will be used.

5.1.3 STI and Web Services

Since STI will use the SOAP protocol and SOAP with Attachments, the STI specification will follow the recommendations from the OMA MWS group found in [OWSER Core Spec].

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5.2 Transcoding Operation model

STI is based on a request-response model. An STI transcoding operation is as follows:

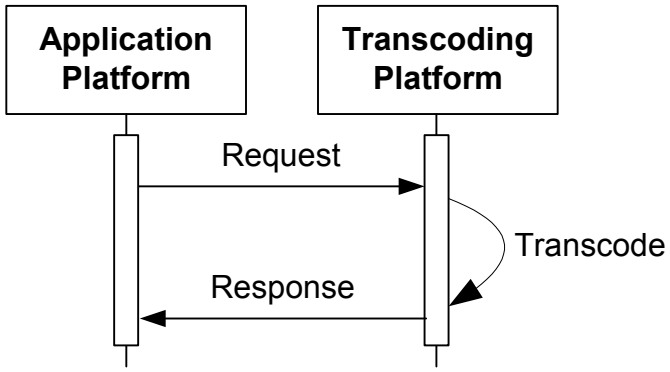

Figure 6 – Transcoding operation

The transcoding requests and responses will be based on transcoding operations between the Application Platform and the Transcoding Platform. The Transcoding Platform receives the request, parses it, handles it and generates a response to the originating Application Platform.

If the content is referenced instead of being attached to the request, the Transcoding Platform will fetch the content, perform the necessary transcoding, and then may store the result in the remote content database or server. Upon receiving the response, the Application Platform may fetch the result. This can be seen in the following diagram.

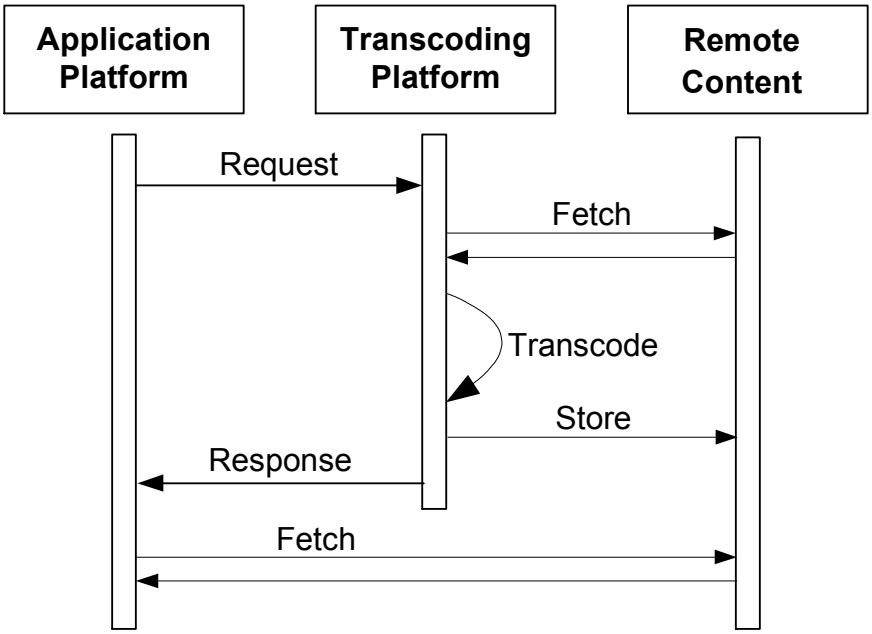

Figure 7 – Transcoding operation with referenced content

Note that hybrid scenarios are also possible, i.e. content attached in the request and referenced in the response, or referenced in the request and attached in the response, depending on parameters specified in the request.

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Each transcoding request will contain one or more transcoding job. Consequently, each transcoding response will contain one or more job result, one job result per transcoding job. The transcoding response will only be returned when all the transcoding jobs have been completed.

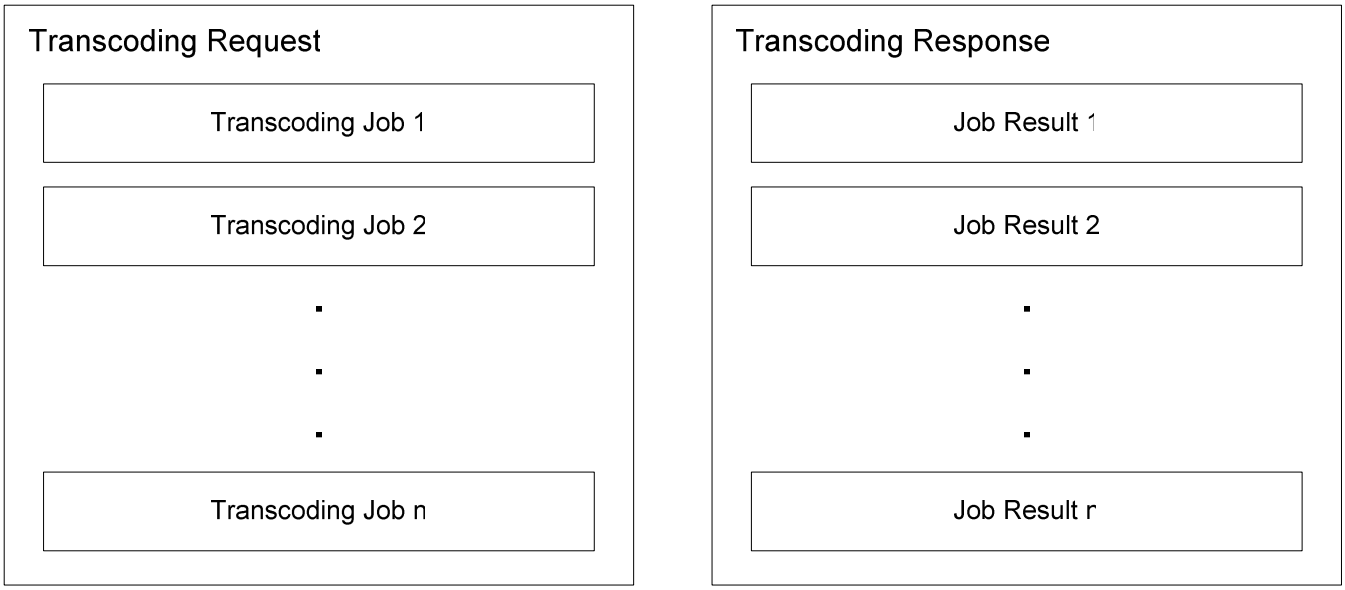

Figure 8 – Transcoding Request and Response structure

Each transcoding job will contain a source and a target. The source represents the input media file(s) (content) and characteristics and the target represents the desired output characteristics (e.g. output codec, file format, maximum size, etc.). A media file (content) can be a single media (e.g. an image, audio, video or text file) or a multipart containing several media elements and possibly a presentation file.

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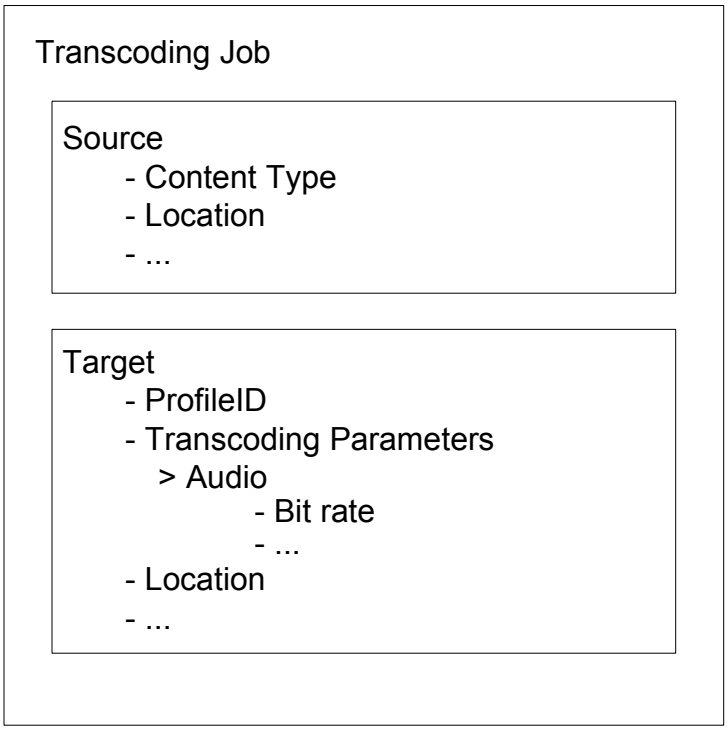

Figure 9 – Transcoding Job Structure

The structure of the Job Result is as follows:

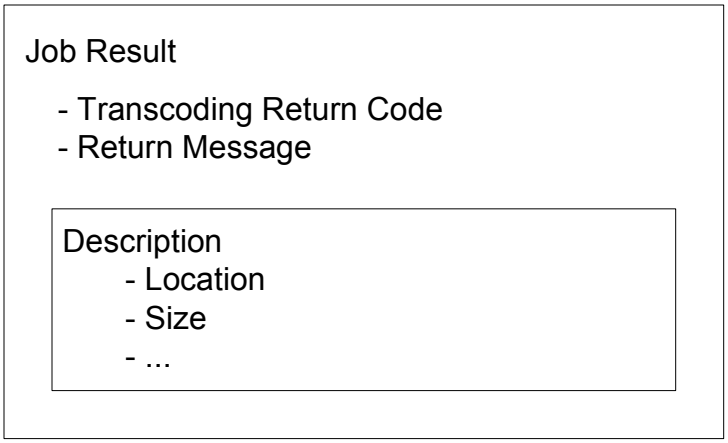

Figure 10 – Job Result Structure

The input media elements (content) can be attached to the transcoding job, i.e. within the transcoding request, or referenced and fetched externally by the transcoding platform.

Similarly, the output media elements (output content) can be attached to the job result, i.e. within the transcoding response, or referenced and fetched externally by the application platform.

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5.3 System and Subsystem Descriptions

Since STI is an interface, the "systems" described in this section will be the transport mechanism, the STI interface itself, and the STI data description (schema).

5.3.1 Transport Mechanism "System"

Name: STI Transport Mechanism

Description:
The transport mechanism used for the various STI reference points can be HTTP, secure-HTTP (HTTPS), FTP, or any other protocol decided between the Application Platform and the Transcoding Platform.

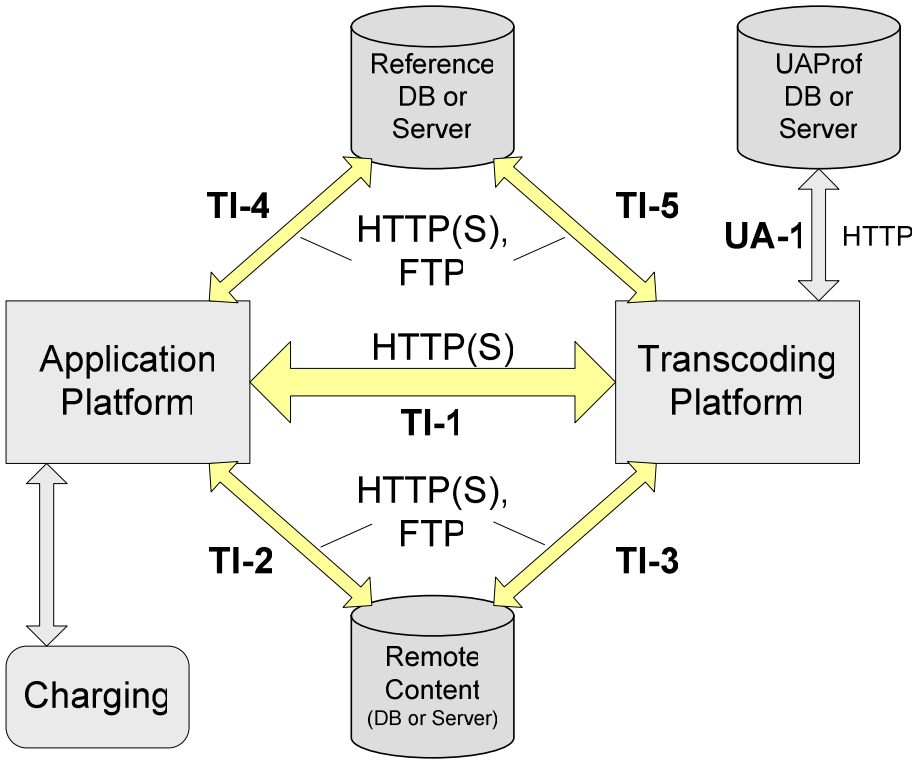

Figure 11 – STI Transport Mechanisms

5.3.2 STI Interface "System"

STI consists of several reference points.

TI-1, TI-1S: Transcoding interface. TI-1S is a secured TI-1 interface, using HTTPS.

TI-2, TI-3, TI-2S, TI-3S: Remote Content interface. TI-2S is a secured TI-2 interface, using the secured variant of the protocol used (e.g. HTTPS), similarly for TI-3S.

TI-4, TI-5, TI-4S, TI-5S: Reference database/server interface. TI-4S is a secured TI-4 interface, using the secured variant of the protocol used (e.g. HTTPS), similarly for TI-5S.

UA-1: interface to UAProf database or server [UAPROF]

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They are described in the following sections.

5.3.2.1 TI-1 Reference Point

Name: TI-1

Description:
Interface between the Application Platform and the Transcoding Platform. The SOAP protocol is to be used over HTTP or HTTPS transport as per [OWSER Core Spec].

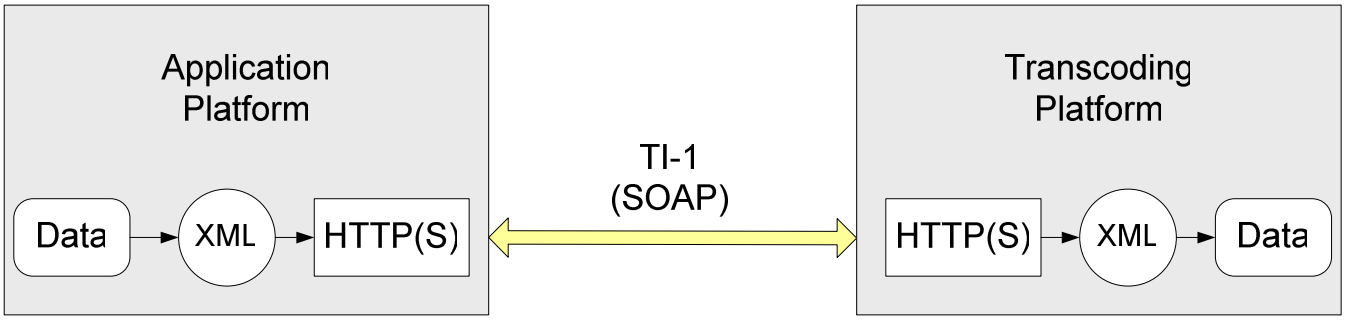

Figure 12 – TI-1 Reference Point

Responsibility:
The Application Platform prepares and sends transcoding requests to the Transcoding Platform.
The Transcoding Platform adapts the content according to the information associated with the handset profile reference and/or from the various transcoding parameters specified in the transcoding request as described in section 5.1.
The Transcoding Platform returns the result (transcoding response) to the Application Platform. The result may contain the attachments or references to them.

Additional Information:
STI supports the following media types:

- Image
- Audio
- Video
- Text
- Multipart

Transcoding is allowed within a media type (e.g. from H.263 to MPEG-4 video) as well as from one media type to another (e.g. from video to images with presentation).

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Figure 13 shows the structure of a Transcoding Request.

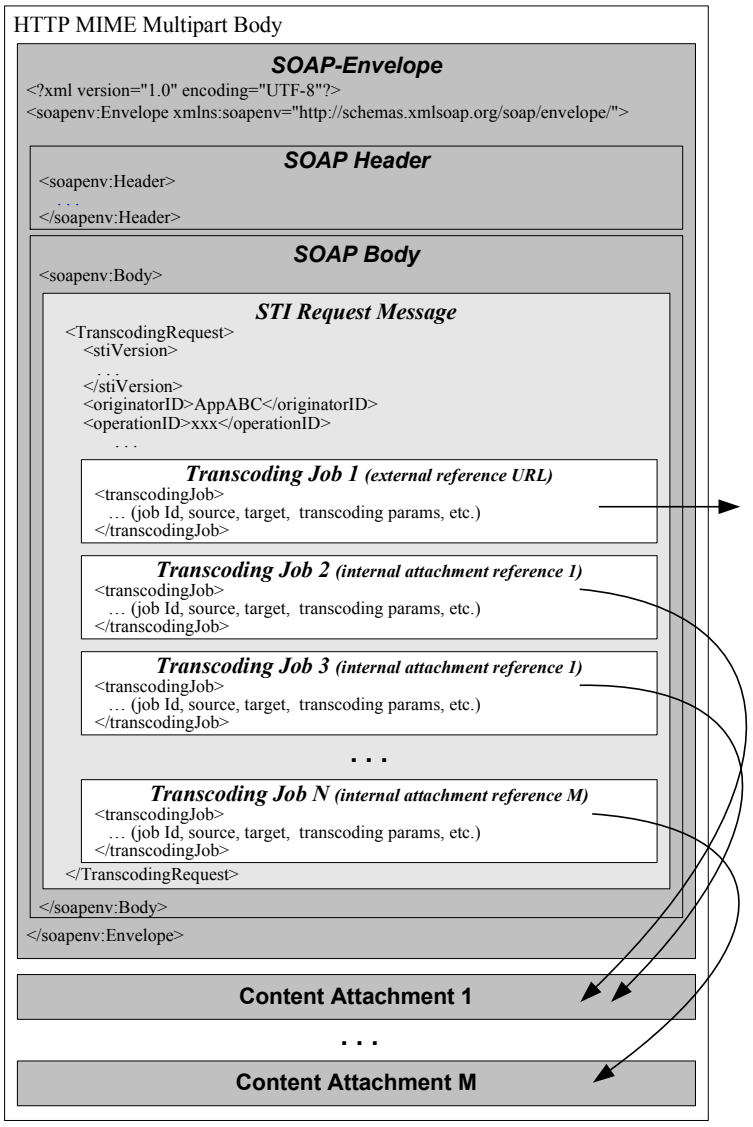

Figure 13 – STI Transcoding Request Structure

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Figure 14 shows the structure of a Transcoding Response.

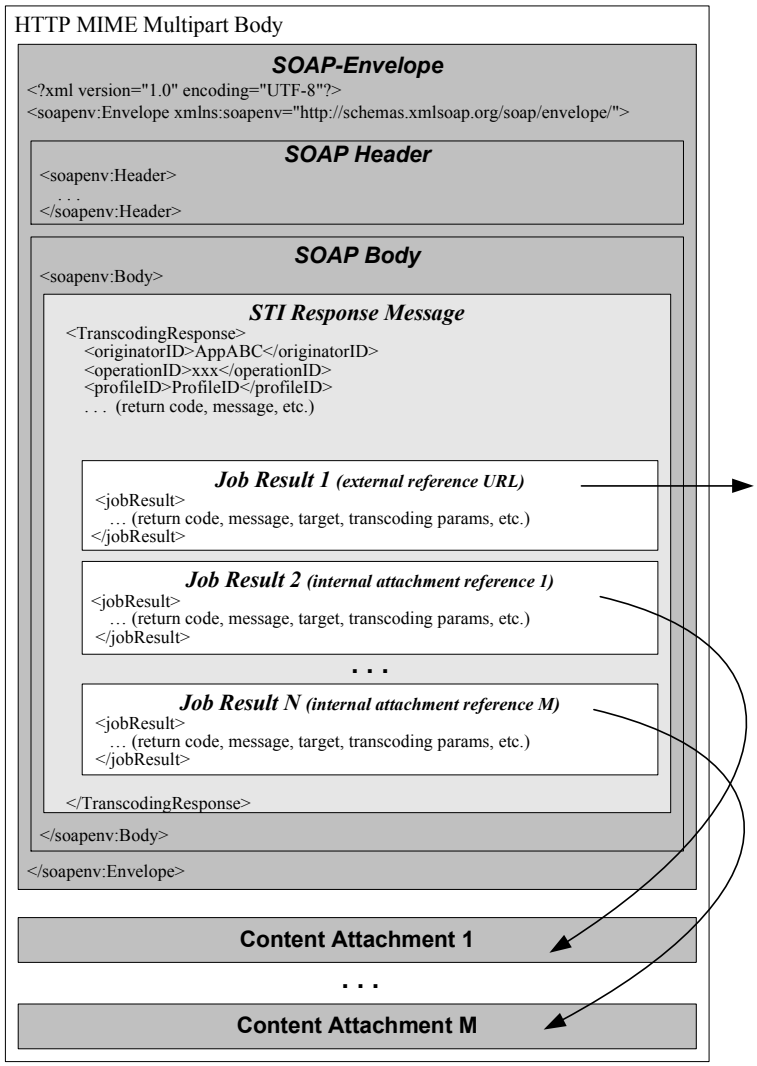

Figure 14 – STI Transcoding Response structure

5.3.2.2 TI-2 and TI-3 Reference Points

Name: TI-2, TI-3

Description:

Interface between the Application Platform and remote content databases/servers (TI-2) and between the Transcoding Platform and remote content databases/servers (TI-3).

Responsibility:

This interface is used when transcoding requests and/or responses use references to external content instead of including the content attachments within the request and/or response itself.

Before sending a transcoding request, the Application Platform may upload the media elements (content) to be transcoded in the remote content database or server. When preparing the request, the Application Platform may insert the URL(s) corresponding to the media elements in the transcoding request.

Upon reception of the transcoding request, the Transcoding Platform will fetch the content from the remote content database or server using the URL(s) provided in the request. The Transcoding Platform will then adapt the media elements according to the information associated with the handset profile reference and/or from the various transcoding parameters specified in

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the request. The Transcoding Platform may then store (upload) the transcoded media elements (output content) in the remote content database/server and include the corresponding URL(s) in the response to the Application Platform.

5.3.2.3 TI-4 and TI-5 Reference Points

Name: TI-4, TI-5

Description:

Interface between the Application Platform and reference databases/servers and between the Transcoding Platform and reference databases/servers.

Responsibility:

This interface is used to store and retrieve information associated with handset profile reference (capabilities and/or detailed transcoding profiles for specific User Equipment) and application policies for cases where references to such information are included in the transcoding requests. The information available from a UAProf database/server may not be sufficient for advanced transcoding decisions. That is why more detailed transcoding profiles can be stored in this reference database or server, or even in the internal database of a Transcoding Platform.
Before sending a transcoding request, the Application Platform may upload any necessary detailed transcoding profiles and/or application policy information into a reference database/server. When preparing the request, the Application Platform may insert the URI(s) corresponding to the detailed transcoding profile and/or application policy information in the transcoding request.

Upon reception of the transcoding request, the Transcoding Platform may fetch the information associated with the handset profile reference and/or application policy information from a reference database/server using the URI(s) provided in the request (if provided in the request). The Transcoding Platform will then adapt the content according to the information associated with the handset profile reference and/or application policy information and/or from the various transcoding parameters specified in the request.

Additional Information:

Policies represent behaviours of the Transcoding Platform and are out of the scope for STI 1.0. Only a reference to external policies information is standardized in STI 1.0. This means that a set of policies may be referenced in a transcoding request coming from an Application Platform. The Transcoding Platform should then take into consideration the referenced policies.

5.3.2.4 UA-1 Reference Point

Name: UA-1

Description:

Interface between the Transcoding Platform and the UAProf database/server (Note: the UAProf database is also known as CCPP repository, see [UAPROF] and [CCPPex]). This interface is not in the scope of STI, this section is included here for information purposes only.

Responsibility:

The transcoding request may include handset profile information in the form of a UAProf, which is essentially an absolute URI referencing CPI (Capability and Preference Information) [UAPROF].
Upon receiving a transcoding request, the Transcoding Platform may use the UA-1 interface to retrieve the profile information from the UAProf database/server (CCPP repository).
The Transcoding Platform can then customize the content according to the information contained within the profile.

Additional Information:

A UAProf database/server (or CCPP profile repository) typically would be an HTTP server that provides UAProf CPI elements upon request. UAProf profiles may reference data stored in repositories provided and operated by the subscriber; network operator; gateway operator, device manufacturer; or service provider [UAPROF].

5.3.3 STI Data Description "System"

Name: STI Data Description

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Description:
Description of the various parameters, structures and formats of the STI specification.

Additional Information:
XML schema is used for the STI data description. The XML-schema defined in the [STI SPEC] describes the valid format of an STI XML data-set, which essentially describes the XML tags to build the transcoding requests and responses. This definition includes what elements are (and are not) allowed at any point, what attributes for any element may be, the number of occurrences of elements, etc.

Please refer to the various W3C documents describing the specifications for XML Schema 1.0: [XML SCHEMA], [XML SCHEMA 0], [XML SCHEMA 1], [XML SCHEMA 2].

Note that the actual schema is defined in a .xsd file [STI XSD].

5.4 Subsystem Collaboration

The following is an example of a sequence of events for a transcoding request.

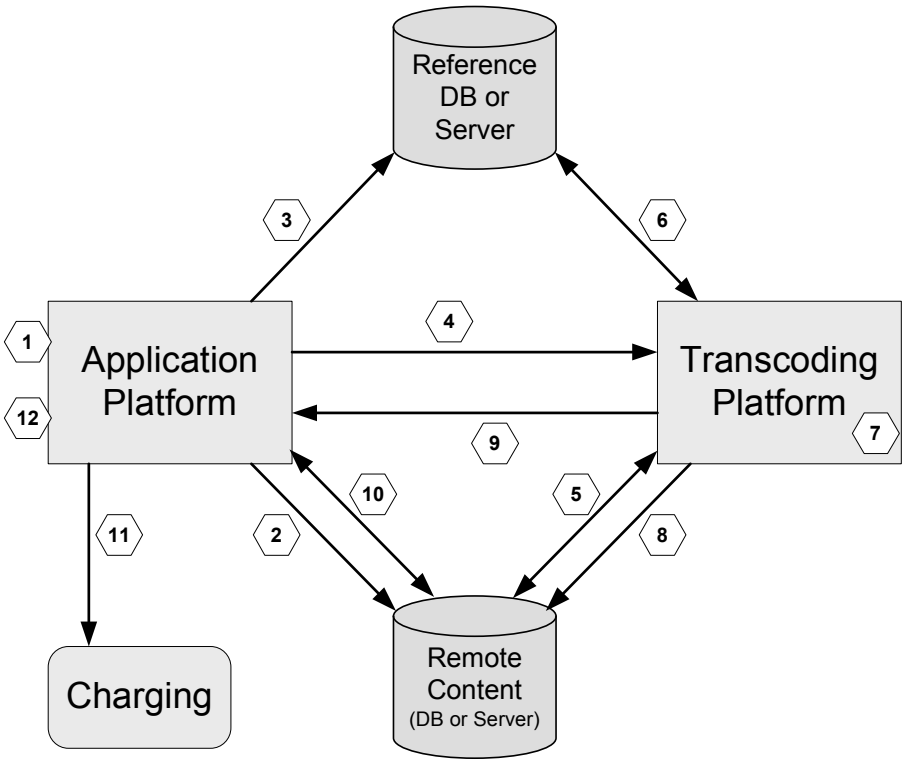

Figure 15 - STI Sequence Example

1. The Application Platform has media elements (content) that need to be transcoded.
2. The Application Platform uploads the media elements to the Remote Content database/server.
3. The Application Platform uploads any detailed transcoding profile and/or policy information to a Reference Database.
4. The Application Platform prepares and sends the transcoding request to the Transcoding Platform.

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5. The Transcoding Platform fetches the media elements (content) from the remote content database/server based on the URL(s) provided in the request.
6. The Transcoding Platform fetches the detailed transcoding profile and/or policy information from the reference database/server based on the URL(s) provided in the request.
7. The Transcoding Platform performs the necessary transcoding on the media elements.
8. The Transcoding Platform uploads the transcoded media elements to the remote content database/server.
9. The Transcoding Platform sends the response to the Application Platform including the URL(s) of the transcoded media elements.
10. The Application Platform fetches the transcoded media elements from the remote content database/server.
11. If necessary, the Application Platform sends charging information (outside scope of STI specification)
12. The transcoded content is available to be sent or distributed.

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Appendix A. Change History (Informative)

A.1 Approved Version 1.0 History

Reference	Date	Description
OMA-AD-STI-V1_0	15 May 2007	Status changed to Approved by TP: OMA-TP-2007-0149R01-INP_STI_V1_0_ERP_for_Final_Approval

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