



3D Contents Creation Service APIs (3DCAPI)

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1. Scope

This Enabler Release (ER) document is a combined document that includes requirements, architecture and technical specification of the 3D Contents Creation Service API (3DCAPI) Enabler.

The scope of OMA 3DCAPI enabler will include:

- Requirements, architecture and specifications for web-based APIs to expose services available from external services to developers and applications.
- The web-based APIs that will work in the framework that 3DCAPI defines, where the web-based APIs exposing the services from the external services that are connected with the developers and applications.
- The framework provided by the 3DCAPI to enable applications to work through standardized APIs with external services or other enablers such as DWAPI-3DP.

OMA will continue expanding the coverage of the 3DCAPI in areas where standardization helps the markets to expand and innovate.

2. References

2.1 Normative References

- [RFC2119] "Keywords for use in RFCs to Indicate Requirement Levels", S. Bradner, March 1997, [URL:http://www.ietf.org/rfc/rfc2119.txt](http://www.ietf.org/rfc/rfc2119.txt)
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- [DWAPI3DP] "Device Web APIs for 3D Printer", Open Mobile Alliance™, OMA-ER-Device_WebAPIs_3DP-V1_0-20181021-A, [URL:http://www.openmobilealliance.org/](http://www.openmobilealliance.org/)

2.2 Informative References

- [OMADICT] "Dictionary for OMA Specifications", Version 2.9, Open Mobile Alliance™, OMA-ORG-Dictionary-V2_9-20120626-A, [URL:http://www.openmobilealliance.org/](http://www.openmobilealliance.org/)
- [GARTNER] "Gartner Glossary", Gartner, [URL:https://www.gartner.com/en/information-technology/glossary](https://www.gartner.com/en/information-technology/glossary)

3. Terminology and Conventions

3.1 Conventions

The keywords "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in [RFC2119].

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

3.2 Definitions

3D Modelling	A process of modelling which converts 2D images to 3D models.
3D Pre-processing	A part of the 3D modelling process. To make effective modelling, the pre-processing does matching the body part of the 2D original images, creates information the matching and pass the information to the 3D modelling process.
Neural Network	A type of data processing, inspired by biological neurons, that converts between complex objects (such as audio and video) and tokens suitable for conventional data processing.

3.3 Abbreviations

3DCAPI	3D Contents Creation service API
AI	Artificial Intelligent
API	Application Programming Interface
APP	Application
DWAPI-3DP	Device WebAPI for 3D Printer
GotAPI	Generic open terminal API
HTTP	Hypertext Transfer Protocol
IF	Interface
JSON	JavaScript Object Notation
OMA	Open Mobile Alliance
REST	Representational State Transfer
RPC	Remote Procedure call
URI	Uniform Resource Identifier
WebRTC	Web Real-Time Communication

4. Introduction

There are many APPs, and SNSs are dealing with 3D contents image and video, including 3D emojis. The importance of 3D contents is getting bigger and bigger due to the expansion of the AR and VR market including game industry; the 3D contents are hard to create because the making process is time-consuming work and needs a large number of 3D contents experts such as 3D modeller and designer, however.

To overcome these limitations, many kinds of AI technologies are used to create or convert 2D image to 3D model and are developing as converting engines of online services.

While there are various types of AI-based services to be used by 3D contents developers, there are fundamental issues to be solved for certain markets:

- More APPs and Services need 3D contents handling with a simple access method
- There are needs to get 3D contents from original 2D images without using complex off-line tools and 3D modelling expert.
- Since there are no open standardized APIs for the AI-based 3D contents creation/converting service, the developers are required to make 3D contents for their various applications for each and every different 3D contents.

As the starting point to solve this problem, OMA has standardized 3DCAPI (3D Contents creation service API) [***]. 3DCAPI provides the framework to enable developers and applications to work with 3D contents model, which is created by AI-based engine from given 2D images by the developers and the applications.

4.1 Version 1.0

3DCAPI version 1.0 includes the following functionality:

- Requirements and API specifications for 3DCAPI, with selected services based on market requirements, based on the web technologies
- Supporting information model and service flows

5. Requirements

(Normative)

5.1 High-level Functional Requirements

In order to 3DCAPI being a versatile web application framework, OMASpecWorks 3DCAPI Enabler specifies web-based APIs. Therefore, the OMASpecWorks 3DCAPI Enabler should consider, but not limited to, data formats, sequence flows, security measures and etc.

Label	Description	Release
3DCAPI-HR-001	The 3DCAPI SHALL have a real-time clock that is synchronized to UTC and SHALL be aware of its local time zone.	1.0
3DCAPI-HR-002	The 3DCAPI SHALL have a real-time clock with a resolution that matches the resolution of any device that it interacts with.	1.0
3DCAPI-HR-003	The 3DCAPI SHOULD be able to provide the software revision to the application if the 3DCAPI can get the software revision. If reported, it SHALL be reported as a string.	
3DCAPI-HR-004	The 3DCAPI SHOULD be able to provide the protocol revision to the application if the 3DCAPI can get the protocol revision. If reported, it SHALL be reported as a string.	
3DCAPI-HR-005	3DCAPI Servers SHALL support APIs exposed via HTTP/1.1 [HTTP/1.1].	1.0
3DCAPI-HR-006	3DCAPI Servers SHALL support APIs exposed via custom URI scheme handlers.	1.0
3DCAPI-HR-007	3DCAPI Servers MAY support APIs exposed via the WebSocket API [WebSocket].	
3DCAPI-HR-008	3DCAPI Servers MAY support APIs exposed via Server-Sent Events [SSE].	
3DCAPI-HR-009	3DCAPI Servers MAY support APIs exposed via the WebRTC API [WebRTC].	
3DCAPI-HR-010	3DCAPI Servers MAY support APIs exposed via HTTP/2.0 [HTTP/2.0].	
3DCAPI-HR-011	3DCAPI Servers SHALL support APIs exposed using the REST design pattern.	1.0
3DCAPI-HR-012	3DCAPI Servers MAY support APIs exposed using the RPC design pattern, including APIs exposed using JSON-RPC 2.0 [JSON-RPC] as payload protocol.	
3DCAPI-HR-013	3DCAPI Servers SHALL support APIs that include the transfer of 2D image type.	1.0
3DCAPI-HR-014	3DCAPI Servers SHALL support APIs that include the transfer of 3D model media type.	1.0
3DCAPI-HR-015	Multiple 3DCAPI Servers SHOULD be implementable and functional simultaneously on an application where possible.	
3DCAPI-HR-016	3DCAPI SHOULD support an API that provides applications with availability of 3DCAPI in response to query requests from the application.	
3DCAPI-HR-017	3DCAPI Servers SHOULD support data integrity for all data exchanged with clients.	
3DCAPI-HR-018	3DCAPI Servers SHOULD support data integrity verification via digitally signed API request/response payloads.	
3DCAPI-HR-019	3DCAPI Servers SHOULD support confidentiality for all data exchanged with clients.	
3DCAPI-HR-020	3DCAPI Servers SHOULD support data confidentiality via encrypted API request/response payloads.	

5.2 3D Contents Specific Functional Requirements

The following requirements outline the 3D Contents Creation Service-specific set of options. The 3DCAPI technical specifications will address the necessary functions for support of these options.

Label	Description	Release
3DCAPI-SR-001	The 3DCAPI SHALL provide the value that reports the information of the 3D Contents Creation Service including service information, 3D modelling attributes and status of the modelling.	1.0

Label	Description	Release
3DCAPI-SR-002	The 3DCAPI service information SHOULD include service name, vendor name, model number, software revision, protocol revision and system ID.	
3DCAPI-SR-003	The modelling attributes SHALL include image type, image of front, image of side, image of back, information of guide(silhouette) image.	1.0
3DCAPI-SR-004	The status information SHOULD include modelling status and its snapshot image.	
3DCAPI-SR-005	The 3DCAPI SHALL support to order the 3D Contents Service to start 3D modelling and to end 3D modelling.	1.0
3DCAPI-SR-006	The 3DCAPI SHALL provide functions to connect 3D Content Creation Services.	1.0
3DCAPI-SR-007	The 3DCAPI SHOULD be able to get secure information from a 3D Contents Creation Service and provide the information to the application to make a secure connection between the service and the application.	
3DCAPI-SR-008	The 3DCAPI SHOULD be able to provide a value that indicates the URL of the 3D Contents Creation Service.	
3DCAPI-SR-009	The 3DCAPI SHALL be able to get a list of services from the 3D Contents Creation Service and provide the list of information.	1.0
3DCAPI-SR-010	The 3DCAPI SHALL be able to get a list of guide (silhouette) images from the 3D Contents Creation Service and provide the list of information to the application.	1.0

6. Architectural Model

6.1 Basic Data Flows

To create a 3D model from an original drawing, the following basic data flows are applied.

1. A User selects a 2D template which is shown as a shape of the silhouette.
2. The user draws original figures using the template as a guide of the figure.
3. The original figures are transmitted to Pre-processing via IF1.
4. The 3D Analyzer2 analyses parameters on the original figures. The 3D Analyzer1 performs the body-part analysis based on the template information.
5. The Structuralization makes a structural object using the results of the 3D Analyzer1 and Analyzer2. The structural object is sent to Modeling via IF2.
6. According to the structural object, 3D modelling data is generated as a result. During the performing of Modeling, the Weighted Neural Network or the Partial 3D Reconstruction Neural Network is used.
7. The generated 3D model data is transmitted to the Contents Device via IF3. The 3D model data and the structural object could be sent at the same time.

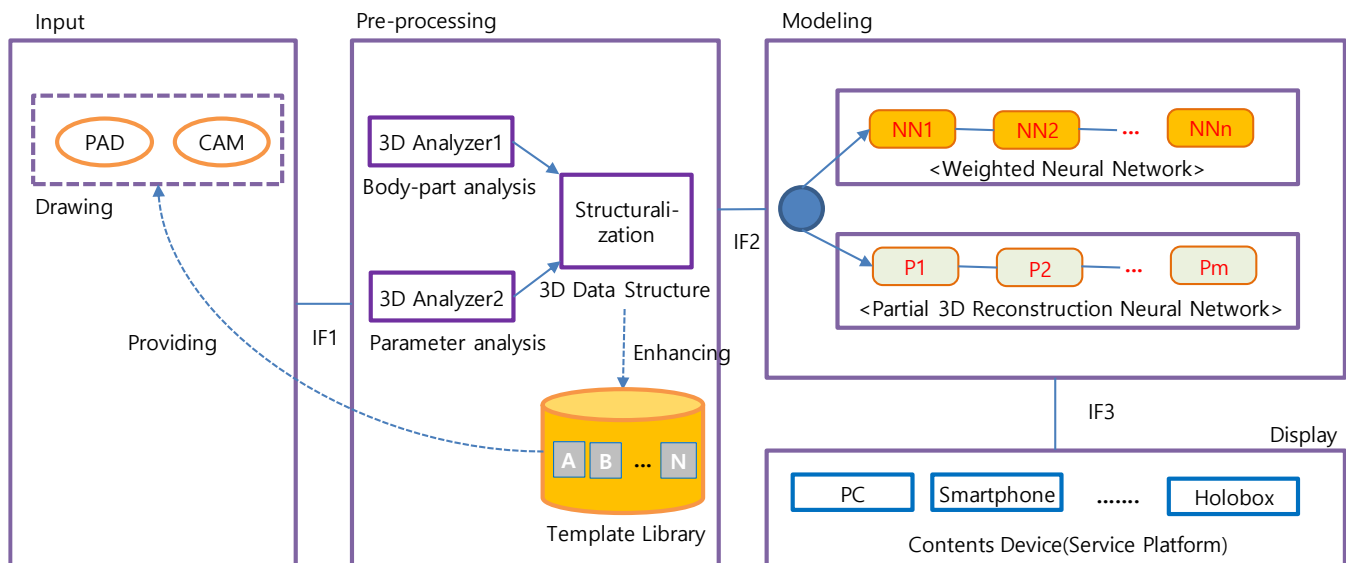


Figure 6-1: Machine Learning-based 3D Character Creation System

6.2 Architectural Diagram

This section summarizes how the 3DCAPI is functioning.

When an application is initiated by a user, the application obtains authorization for access to 3DCAPI using the 3DCAPI-1 Interface. Once the application is authorized by the 3DCAPI Server, the application can access the 3DCAPI Server using the 3DCAPI-1 Interface.

After the authorization, the application asks the 3DCAPI Server, using the 3DCAPI-1 Interface, what kind of services are available. Then the 3DCAPI Server requests the current status of the available services to the 3D Contents Creation Service using the 3DCAPI-2 Interface. This procedure is called the "Service Discovery", which is defined in the 3DCAPI

specification. After the Service Discovery, the application can interact with the specified service (i.e., the service) via the 3DCAPI Server.

When an application sends an API request on the 3DCAPI-1 Interface, the 3DCAPI Server passes it to the 3D Contents Creation Service using 3DCAPI-2.

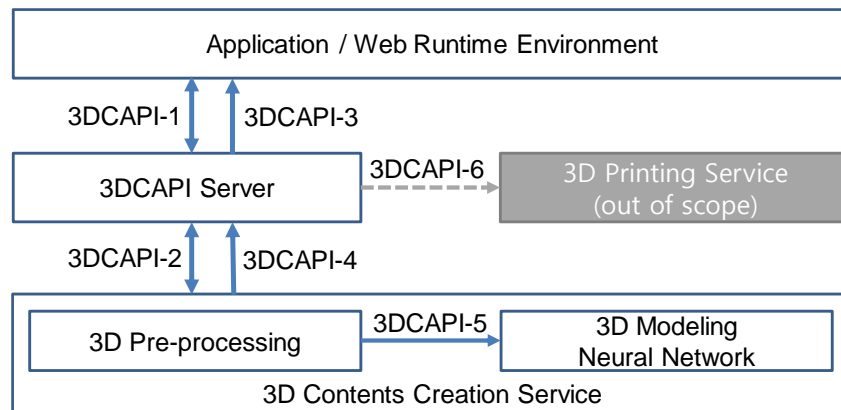


Figure 6-2: 3DCAPI Architectural Diagram

In addition to HTTP, an application may be connected by the 3DCAPI Server using WebSocket, which is the 3DCAPI-3. The 3DCAPI-3 Interface enables that whenever the 3DCAPI Server reports event messages, the application receives the messages on the 3DCAPI-3 Interface asynchronously.

The 3D data generation is mostly a time-consuming process. Therefore, the Application could not be waiting for a long time to get the result from the 3DCAPI Server. In this case, the 3DCAPI Server has noticed the completion of 3D data generation and received the result file by the 3D Contents Creation Service via 3DCAPI-4 Interface. All these processes between the 3DCAPI Server and the 3D Contents Creation Service are made asynchronously, and the 3DCAPI-4 Interface is using WebSocket.

After the getting result 3D data file, the 3DCAPI Server sends a message of completion notice to the Application and initiates the file transferring to the Application using the 3DCAPI-3 Interface.

The 3DCAPI Server is agnostic to what 3D Contents Creation Server does inside. The 3DCAPI Server passes a request from an application to a 3D Contents Creation Server and passes a response from the 3D Contents Creation Server via 3DCAPI-4 Interface to the application.

In the 3D Contents Creation Server, there is 3DCAPI-5 Interface between 3D Pre-processing and 3D Modeling Neural Network. Using the 3DCAPI-5 Interface, 3D Pre-processing could send the result of pre-processing to 3D Modeling Neural Network. If the 3D Modeling Neural Network is changed, 3D Pre-processing does not need to change the format of sending the result to the changed 3D Modeling Neural Network, which is supporting the 3DCAPI-5 Interface.

The 3D CAPI Server provides external interfaces to communicate external device and service such as the 3D Printing Service via 3DCAPI-6 Interface, which is out-of-scope of 3DCAPI.

6.3 Functional Components and Interfaces/reference point definition

3DCAPI consists of the following seven functionalities;

- 1) The service discovery function enables applications to obtain information of 3D Contents Creation Services and 3D Printing Service available.

- 2) The service connecting function creates a secured channel between the Application and 3DCAPI Server, and passes the ServiceID to make the 2nd secured channel between 3DCAPI Server and 3D Contents Creation Service.
- 3) The file transfer function uploads original images to 3D Contents Creation Server to generate 3D character data.
- 4) The setting attributes function controls the conditions and options for generating the 3D character data.
- 5) The snapshot shows how the 3D character generating process goes to the Application.
- 6) The file receive function provides the ability to handle big sized data such as the 3D character data.
- 7) The 3D printing function enables applications to control and manage 3D Printer via 3DCAPI Server.

6.3.1 Service Discovery

After the application obtains authorization for access to 3DCAPI-based APIs using the 3DCAPI-1 Interface, the application sends the Service Discovery request to the 3DCAPI Server. Then the 3DCAPI Server sends the Service Discovery request to the 3D Contents Creation Server.

6.3.2 Service Connecting

After the completion of the Service Discovery, the application could get the information of a 3D Contents Creation Service provided by the 3D Contents Creation Server through the 3DCAPI Server.

To provide the information to the application, the 3D Contents Creation Server need a pre-handling process to send the information to the 3DCAPI Server from the 3D Contents Creation Server. After that, the application and the 3DCAPI Server do the service connecting using the Service Connecting function. The application gets the 3D Contents Creation Service information from the 3DCAPI Server and makes a request to the 3DCAPI Server to upload 2D original file.

The Service Connecting function offers a list of contents service reported by the 3DCAPI Server as a targeted service in response to a request.

6.3.3 File Transferring

The application obtains authorization to access 3DCAPIs using the 3DCAPI-1 Interface and completes the Service Discovery. The application could use the service File Transferring provided by 3DCAPI Server.

The File Transferring function offers a series of 3DCAPIs to upload original 2D images from an application in real-time. The uploaded images are used in the 3D Contents Creation Service to generate 3D character data by an AI engine. The 3D character generating by AI engine is not a scope of this enabler.

6.3.4 Setting Attributes

To provide the controlling information to the 3D Contents Creation Service, the Application and the 3DCAPI Server need a pre-handling process to get the information by the Application user. After that, the Application and the 3DCAPI Server do the service connecting using the Service Connecting function. The Application sends the 3D contents creation attributes information to the 3D Contents Creation Service via the 3DCAPI Server and makes a request to the Contents Creation Service to start generating a 3D model file.

6.3.5 3D Contents Creation

After the receiving information of attributes for the 3D contents creation, the 3D Pre-processing which is in the 3D Contents Creation Service, analyses the 2D images with referring the information of attributes. The results of the 3D Pre-processing are delivered to the 3D Modeling Neural Network, which is in the 3D Contents Creation Service as well. Between the 3D Pre-processing and the 3D Modeling Neural Network, there is 3DCAPI-5 Interface. The 3D Modeling Neural Network which is supporting the 3DCAPI-5 Interface, the 3D Pre-processing does not need to change the format of sending the result if the 3D Modeling Neural Network is changed,

6.3.6 SnapShot

During a 3D model creation, there is a need to check the progress and intermediate result of the 3D model.

The SnapShot function offers reporting progress function and receiving a 3D model file that could check the degree of completion.

The overall message flows to obtain snapshot by sending HTTP request and response over the 3DCAPI-1 Interface.

6.3.7 File Receiving

If the 3D Contents Creation Service has completed a 3D model generation process, the service returns the 3D model file to the 3DCAPI Server via the 3DCAPI-5 Interface.

After the 3DCAPI Server has received the 3D model file, the server sends a notification message of completion to the Application and transfer the 3D model file using the 3DCAPI-3 Interface.

The definition of a file receiving method is out of the scope of this specification and is depended on the implementation of each application and 3D Contents Creation Service. The implementation of the messages is highly recommended to use the web interface technology, which is used in this specification as well.

6.3.8 3D Printing

After the completion of a 3D model data, it could be 3D printed through the 3D Printing function. The Application could make the 3D Printer to print the 3D model through the interfacing DWAPI and GotAPI Enablers using 3DCAPI-6 Interface.

During a 3D printing, there is the possibility of failure of printing due to many reasons, e.g., run out of filament. In that case, the Application receives the error message from the 3DCAPI-6 Interface.

The 3D Printing function offers reporting functions by the 3D Printing Service. The reporting functions and their message flows are specified in the DWAPI-3DP enabler.

6.3.9 3DCAPI Interfaces

This section introduces 3DCAPI interfaces and their related description.

The 3DCAPI-1 is a bi-directional interface between applications and 3DCAPI Server. To use a 3DCAPI enabler, an application should connect 3DCAPI Server. The 3DCAPI-1 has interfacing functions such as Service Discovery, Service Connecting, File Transferring, Setting Attributes, SnapShot and 3D Printing between an application and 3DCAPI Server.

The 3DCAPI-2 is a one-way interface from the 3DCAPI Server to an application. This interface is mostly related to receiving result files from the 3DCAPI Server, including 3D model data which are relayed from 3D Contents Creation Service.

The 3DCAPI-3 is a mirror interface of the 3DCAPI-1. This interface is bi-directional and getting information from 3DCAPI Server, which is mostly coming from an application through the 3DCAPI-1 interface. The 3DCAPI-2 delivers information or results of 3D Contents Creation Service to 3DCAPI Server.

The 3DCAPI-4 interface handles results files, including 3D model data. This 3DCAPI-4 is a one-way interface from the 3D Contents Creation Service to 3DCAPI Server.

The 3DCAPI-5 is an internal interface in 3D Contents Creation Service; it delivers the result of 3D Pre-processing to 3D Modeling Neural Network.

The 3DCAPI-6 is an out-side interface to connect external enablers such as DWAPI-3DP.

7. 3D Contents Creation Service APIs

7.1 Service Discovery API

The service discovery is an essential function to find useful services for the application.

7.1.1 Functional Description

Service Discovery API enables applications to discover available 3D Contents Modeling services.

After the application obtains authorization, which is out-of-scope of this specification, from 3DCAPI Server for access to 3DCAPI APIs using the 3DCAPI-1 Interface, the application sends the Service Discovery request to the 3DCAPI Server. Then the 3DCAPI Server sends the Service Discovery request to all of the 3D Contents Creation Services. The message flow of the Service Discovery is shown in Fig. 7.1.

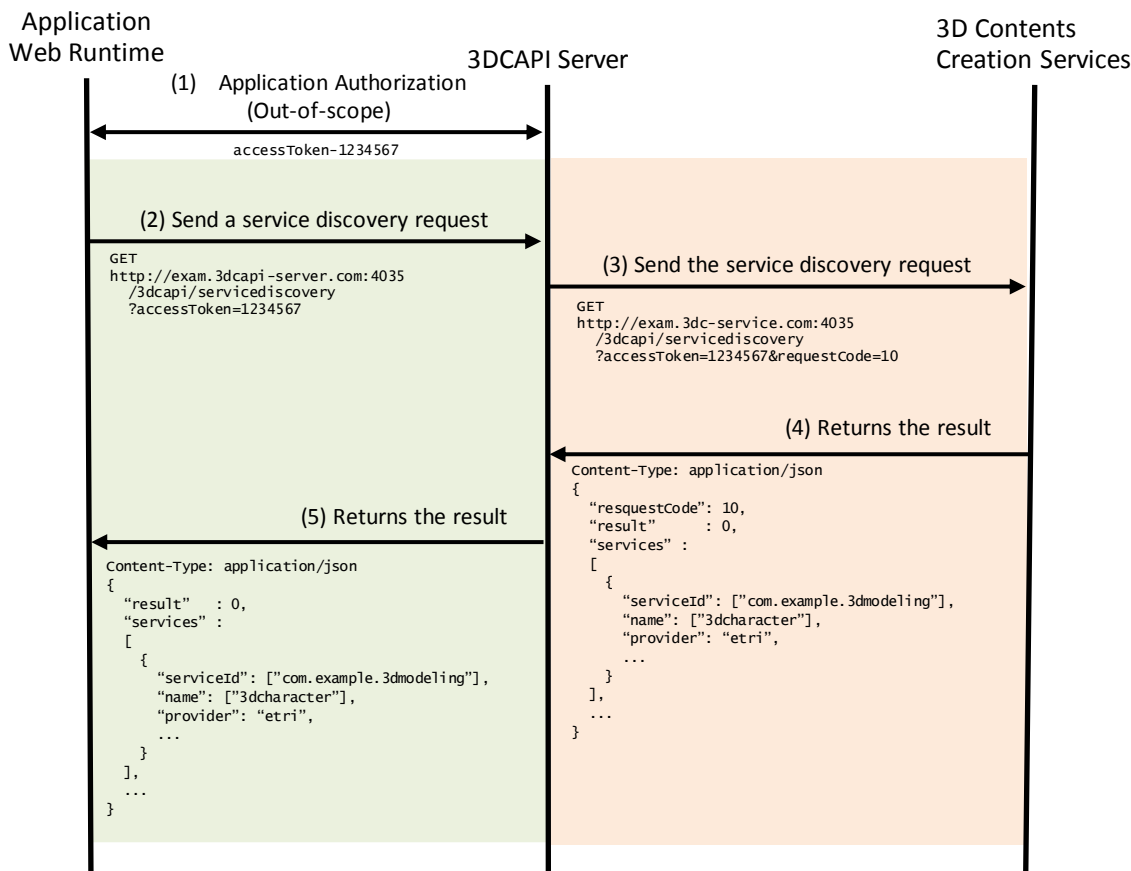


Figure 7.1: Message flow of the Service Discovery

The specific data in the message flow in the figure above is defined in 7.1.2 as API definitions.

7.1.2 API Definition

When the 3DCAPI Server receives the request of the Service Discovery API from an application, the 3DCAPI Server sends the service discovery request to all the 3D Contents Creation Services as registered in the 3DCAPI Server.

This API provides information about what services are in the 3DCAPI Server. This API is available only if the application authorization, which has a dependency on each 3DCAPI Server implementation.

Definition of the request

Definitions	
Method	HTTP GET (REST)
Request URL	http://ip.3dcapi-server.addr:4035/3dcapi/servicediscovery https://ip.3dcapi-server.addr:4036/3dcapi/servicediscovery
Parameters	None

Definition of the request parameters

Parameter name	Definition of value
accessToken	The access token obtained from the 3DCAPI authentication, which is out-of-scope of this specification.

Example of the request URL

```
http://exam.3dcapi-server.com:4035/3dcapi/servicediscovery?accessToken=1234567
```

When the 3DCAPI Server receives the request, it SHALL run the Service Discovery procedure.

The 3DCAPI Server completes the service discovery procedure, and it SHALL respond as follows:

Definition of the response

Definitions	
MIME-Type	application/json
HTTP status	200 OK

The 3D Contents Creation Server receives the service discovery request from the 3DCAPI Server, and the 3D Contents Creation Server SHALL return the message as follows:

Definition of the data object for the service discovery response

Name	Sub name	Type	Definition of value	Mandatory/Optional
requestCode		int	The request code coming from the 3DCAPI Server.	Mandatory
result		int	If success, the value is 0, otherwise an integer other than 0, which indicates an error code. This specification doesn't define error codes.	Mandatory
services		Array		Mandatory
	serviceId	String	The service identifier. The id could be "com.example.3dmodeling".	Mandatory

	name	String	The name of the targeted 3D Contents Creation Service. It could be "3dcharacter".	Mandatory
	provider	String	The service provider of the targeted 3D Contents Creation Service.	Optional
	version	String	The version of the targeted 3D Contents Creation Service.	Optional
	type	String	This value represents the type of the network used to connect to the 3D Contents Creation Service. The value must be any one of "WiFi", "Fixed Internet".	Optional
	online	Boolean	If the service is available, this value SHALL be true. Otherwise (e.g. the 3D Contents Creation Service has not been detected or the 3D Contents Creation Service is not allowed to access any devices), this value SHALL be false.	Mandatory
	scopes	Array	This value SHALL be an array including a string "3dmodeling" as an array element (["3dmodeling", ...]).	Mandatory

The service discovery use case enables a multi-service environment, and applications could have a choice from the lists of 3D Contents Creation Service using Service Connecting API, which is described in 7.2.

7.2 Service Connecting API

Service Connecting API enables applications to discover available 3D contents creation services.

7.2.1 Functional Description

Service Connecting API enables applications to connect a selected 3D Contents Modelling service.

After the application obtains authorization from 3DCAPI Server, which is out-of-scope of this specification, from to the application is enabled to access the 3DCAPI APIs using the 3DCAPI-1 Interface. The application sends the Service Connecting request to the 3DCAPI Server, and the 3DCAPI Server passes the Service Connecting request to the 3D Contents Creation Services. The message flow of the Service Connecting is shown in Fig. 7.2.

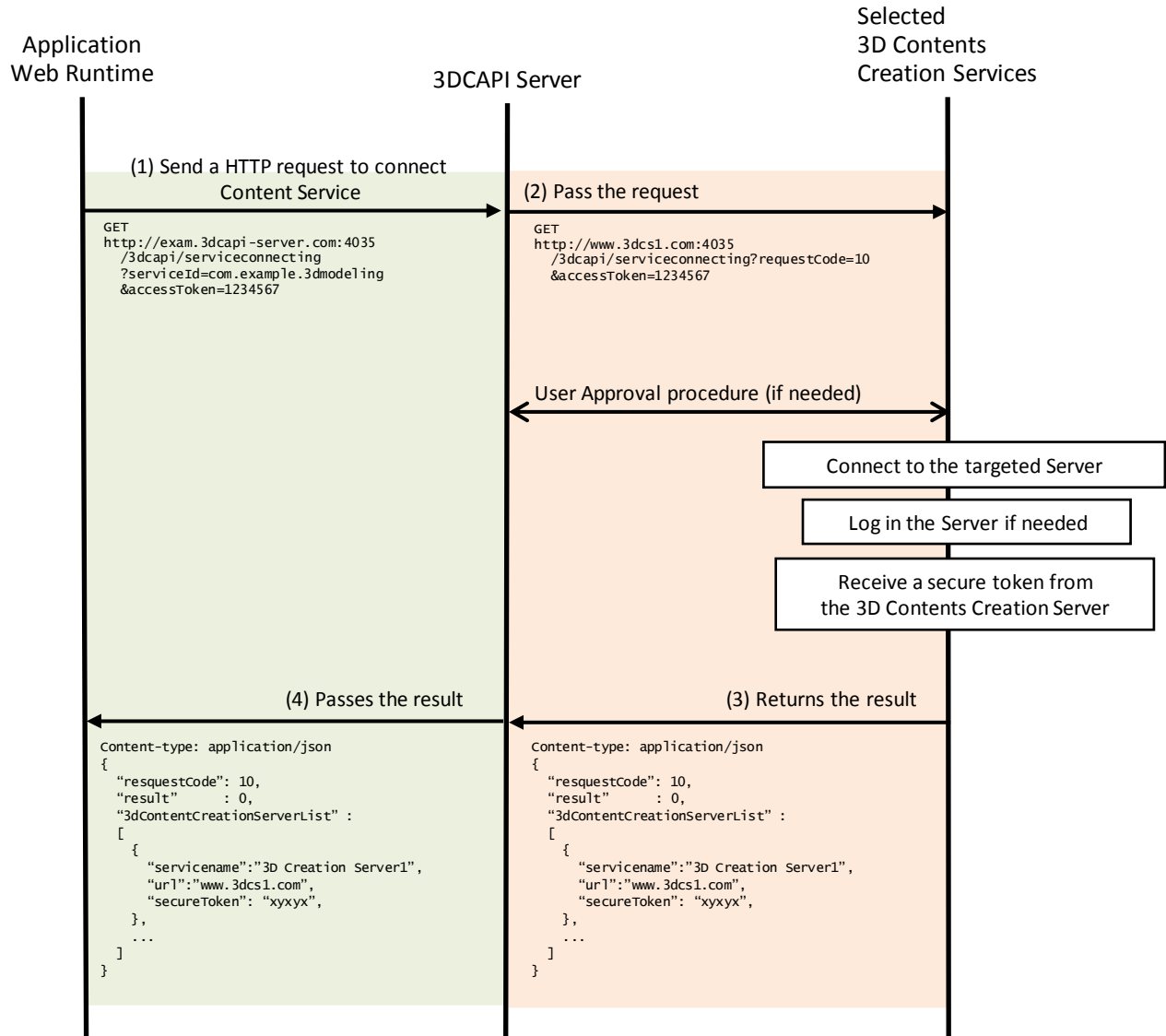


Figure 7.2: Message flow of the Service Connecting

The specific data in the message flow in the figure above is defined in 7.2.2 as API definitions.

7.2.2 API Definition

When the 3DCAPI Server receives the request of the Service Connecting API from an application, the 3DCAPI Server sends the service connecting request to the selected 3D Contents Creation Services.

This API provides information about what service is requested to connect. This API is available only if the application authorization, which has a dependency on each 3DCAPI Server implementation.

Definition of the request

Definitions	
Method	HTTP GET (REST)
Request URL	http://ip.3dcapi-server.addr:4035/3dcapi/serviceconnecting&accessToken=1234567 https://ip.3dcapi-server.addr:4035/3dcapi/serviceconnecting&accessToken=1234567
Parameters	None

Definition of the request parameters

Parameter name	Definition of value
serviceId	The serviceId.
accessToken	The access token obtained from the 3DCAPI authentication which is out-of-scope of this specification.

Example of the request URL

```
http://exam.3dcapi-server.com:4035/3dcapi/serviceconnecting?accessToken=1234567
```

When the 3DCAPI Server receives the request, it SHALL run the Service Connecting procedure.

The 3DCAPI Server completes the service connecting procedure, and it SHALL respond as follows:

Definition of the response

Definitions	
MIME-Type	application/json
HTTP status	200 OK

The 3D Contents Creation Server receives the service discovery request from the 3DCAPI Server, and the 3D Contents Creation Server SHALL return the message as follows:

Definition of the data object for the service connecting response

Name	Sub name	Type	Definition of value	Mandatory/Optional
requestCode		int	The request code coming from the 3DCAPI Server. The code is used for maintaining the session between application and the contents creation server via 3DCAPI Server.	Mandatory
result		int	If success, the value is 0, otherwise an integer other than 0, which indicates an error code. This specification doesn't define error codes.	Mandatory
3dConecntCr eationServe rList		Array		Mandatory
	servicename	String	The service identifier. The id could be "3D Creation Server1".	Mandatory
	url	String	The url of the targeted 3D Contents Creation	Mandatory

			Service. It could be "www.3dcs1.com".	
	secureToken	String	The secure token to maintain security between the application and the targeted 3D Contents Creation Service.	Optional

7.3 File Transfer API

The File Transfer API enables applications to upload the original 2D images to the 3D Contents Creation Server from the user side.

7.3.1 Functional Description

The File Transfer API enables applications to upload the selected 2D images to the 3D Contents Creation Server by the user.

After the application obtains authorization, the application sends a request to upload the file. When the request goes through 3DCAPI Server, and the target server is specified. The 3DCAPI Server forwards the request to the selected 3D Contents Creation Server. The 3D Contents Creation Server returns the response of the request with the information of file transferring.

The application receives the reply and the information from the 3D Contents Creation Server. The application gets a connection to the 3D Contents Creation Server with the information, and uploads the 2D image files. The uploading process and protocol are not in the scope of this specification.

The message flow of the File Transfer is shown in Fig. 7.3.

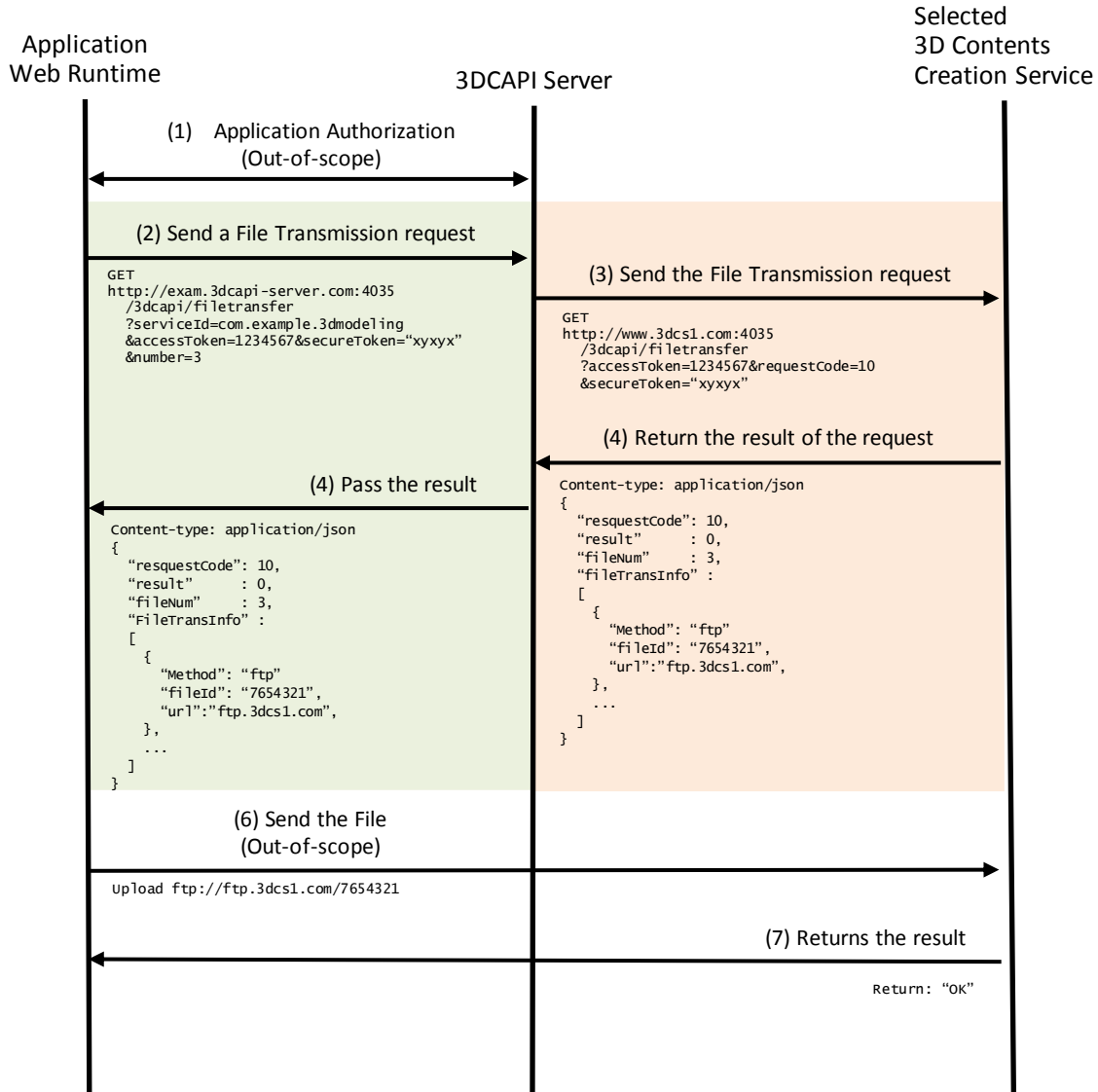


Figure 7.3: Message flow of the File Transfer

The specific data in the message flow in the figure above is defined in 7.3.2 as API definitions.

7.3.2 API Definition

When the 3DCAPI Server receives the request of the File Transfer API from an application, the 3DCAPI Server sends the file transfer request to the selected 3D Contents Creation Services.

This API provides information about what service is requested to connect. This API is available only if the application authorization, which has a dependency on each 3DCAPI Server implementation.

Definition of the request

Definitions	
Method	HTTP GET (REST)
Request URL	http://ip.3dcapi-server.addr:4035/3dcapi/filetransfer?serviceId=com.example.3dmodeling&accessToken=1234567&secureToken="xyxyx"&number=3 https://ip.3dcapi-server.addr:4035/3dcapi/filetransfer?serviceId=com.example.3dmodeling&accessToken=1234567&secureToken="xyxyx"&number=3
Parameters	None

Definition of the request parameters

Parameter name	Definition of value
serviceID	The serviceID.
accessToken	The access token obtained from the 3DCAPI authentication which is out-of-scope of this specification.
secureToken	The secure token is the key to connect to the selected 3D Contents Creation Service.
Number	The number of the file will be transferred to the 3D Contents Creation Service.

Example of the request URL

```
http://exam.3dcapi-server.com:4035/3dcapi/filetransfer?serviceId=com.example.3dmodeling
&accessToken=1234567&secureToken="xyxyx"&number=3
```

When the 3DCAPI Server receives the request, it SHALL run the File Transfer procedure.

The 3DCAPI Server completes the file transfer procedure, it SHALL respond as follows:

Definition of the response

Definitions	
MIME-Type	application/json
HTTP status	200 OK

The 3D Contents Creation Server receives the file transferring request from the 3DCAPI Server, and the 3D Contents Creation Server SHALL return the message as follows:

Definition of the data object for the file transfer response

Name	Sub name	Type	Definition of value	Mandatory/Optional
requestCode		int	The request code coming from the 3DCAPI Server. The code is used for maintaining session between application and the contents creation server via 3DCAPI Server.	Mandatory
result		int	If success, the value is 0, otherwise an integer other than 0, which indicates an error code. This specification doesn't define error codes.	Mandatory

fileNum		int	The number of files to transfer. The value should be equal to or bigger than 1	Mandatory
fileTrans Info		array		Mandatory
	method	string	The file transferring method between the application and the 3D Contents Creation Service. The method could be "ftp" or "websocket". The method itself is out of the scope of this specification.	Mandatory
	fileId	int	The file ID of the transferred 2D image file. It could be "7654321".	Mandatory
	url	string	The url of the targeted 3D Contents Creation Service. It could be "www.3dcs1.com".	Mandatory

7.4 Setting Attributes API

The Setting Attributes API enables applications to set the attributes to generate 3D models from the uploaded 2D images to the 3D Contents Creation Server from the user side.

7.4.1 Functional Description

The Setting Attributes API enables applications to set the 3D modelling parameters to the 3D Contents Creation Server by the user.

After the application obtains authorization, the application sends a request to get the attributes information for generating the 3D model. The 3DCAPI Server forwards the request to the selected 3D Contents Creation Server. The 3D Contents Creation Server returns the response of the request with the information of attributes.

The application receives the reply and the attributes information from the 3D Contents Creation Server. The application sets attributes of the 3D modelling and sends the value of the attributes to the 3D Contents Creation Server via 3DCAPI Server. The attributes are set, the 3D Contents Creation Server responses the results of the adjustment.

The message flow of the Setting Attributes is shown in Fig. 7.4.

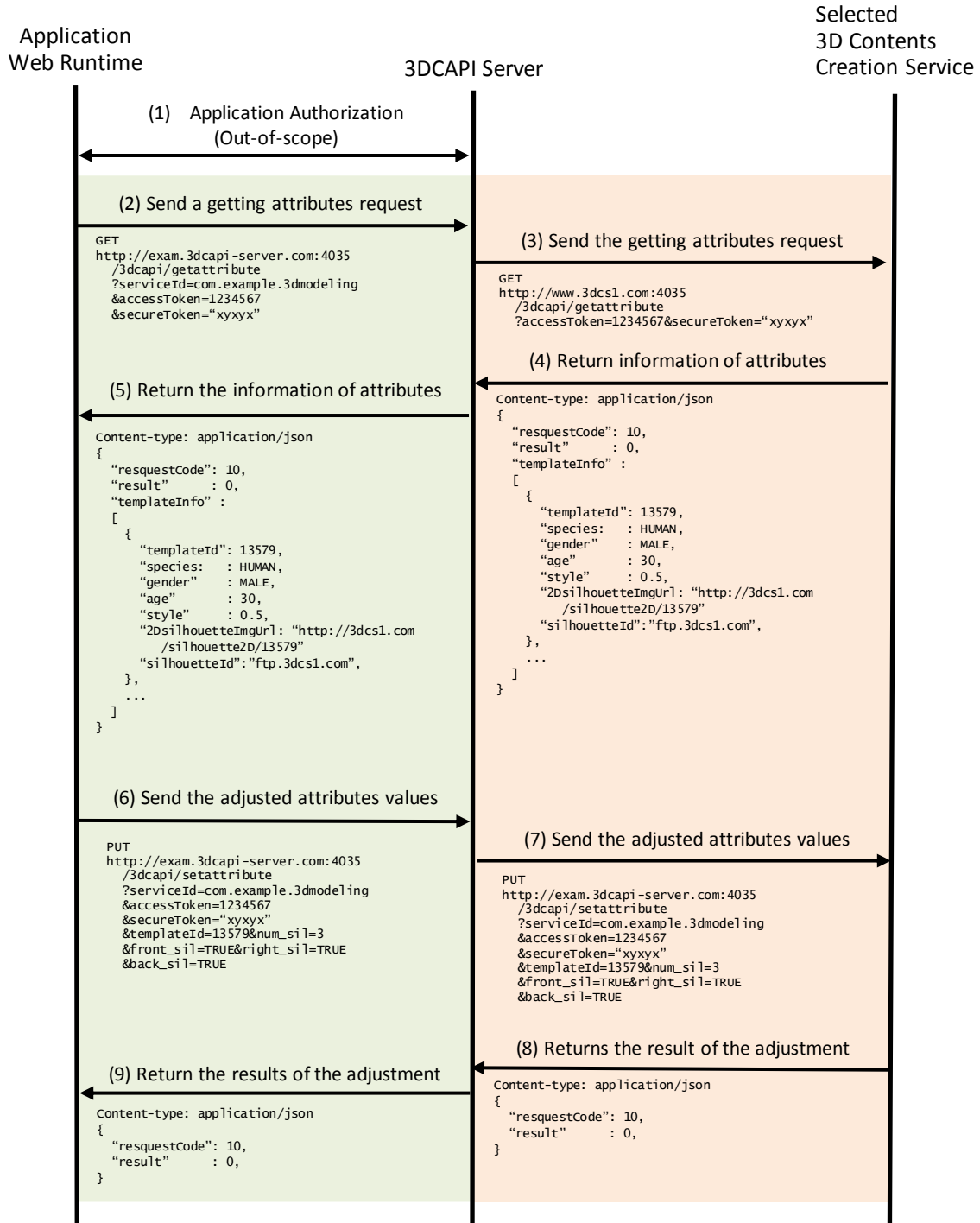


Figure 7.4: Message flow of the Setting Attributes

The specific data in the message flow in the figure above is defined in 7.4.2 as API definitions.

7.4.2 API Definition

When the 3DCAPI Server receives the request of the getting attributes information from an application, the 3DCAPI Server sends the getting attributes request to the selected 3D Contents Creation Services.

This API provides the information about what service is requested to connect. This API is available only if the application authorization, which has a dependency on each 3DCAPI Server implementation.

Definition of the request

Definitions	
Method	HTTP GET (REST)
Request URL	http://ip.3dcapi-server.addr:4035/3dcapi/getattribute?serviceId=com.example.3dmodeling &accessToken=1234567&secureToken="xyxyx" https://ip.3dcapi-server.addr:4035/3dcapi/getattribute?serviceId=com.example.3dmodeling &accessToken=1234567&secureToken="xyxyx"
Parameters	None

Definition of the request parameters

Parameter name	Definition of value
serviceID	The serviceID.
accessToken	The access token obtained from the 3DCAPI authentication which is out-of-scope of this specificaiton.
secureToken	The secure token is the key to connect to selected 3D Contents Creation Service.

Example of the request URL

```
http://exam.3dcapi-server.com:4035
/3dcapi/getattribute?serviceId=com.example.3dmodeling&accessToken=1234567&secureToken="xyxyx"
```

When the 3DCAPI Server receives the request, it SHALL run the getting attributes procedure.

The 3DCAPI Server starts the getting attributes procedure, and it SHALL respond as follows:

Definition of the response

Definitions	
MIME-Type	application/json
HTTP status	200 OK

The 3D Contents Creation Server receives the getting attributes information request from the 3DCAPI Server, and the 3D Contents Creation Server SHALL return the message as follows:

Definition of the data object for the getting attributes response

Name	Sub name	Type	Definition of value	Mandatory/Optional
requestCode		int	The request code coming from the 3DCAPI Server. The code is used for maintaining the session between application and the contents creation server via 3DCAPI Server.	Mandatory
result		int	If success, the value is 0, otherwise an integer other than 0, which indicates an error code. This specification doesn't define error codes.	Mandatory

template Info		array	The template information array	Mandatory
	templateId	int	The template ID indicates a specific template.	Mandatory
	species	string	The attribute indicates species of the generating character. It could be "HUMAN", "ELF" and "ORK" as an example.	Mandatory
	gender	string	The attribute indicates the gender of the generating character. It could be "MALE" and "FEMALE".	Mandatory
	age	int	The attribute indicates the age of the generating character. It is an integer value. The age is getting bigger and bigger, and the character is growing older and older.	Mandatory
	style	float	The style indicates the ratio of head and body.	Mandatory
	2Dsilhouette ImgUrl	string	The url of the targeted 2D silhouette image of the template.	Mandatory
	silhouetteId	int	The silhouette ID of the template silhouette image file. It could be "7654321".	Mandatory

After receiving the returned information, the application sends a request of the setting attributes to the selected 3D Contents Creation Server.

Definition of the request

Definitions	
Method	HTTP PUT (REST)
Request URL	http://exam.3dcapi-server.com:4035/3dcapi/setattribute?serviceId=com.example.3dmodeling&accessToken=1234567&secureToken="xyxyx"&templateId=13579&num_sil=3&front_sil=TRUE&right_sil=TRUE&back_sil=TRUE https://exam.3dcapi-server.com:4035/3dcapi/setattribute?serviceId=com.example.3dmodeling&accessToken=1234567&secureToken="xyxyx"&templateId=13579&num_shi=3&front_sil=TRUE&right_sil=TRUE&back_sil=TRUE
Parameters	None

Definition of the request parameters

Parameter name	Definition of value
serviceID	The serviceID.
accessToken	The access token obtained from the 3DCAPI authentication which is out-of-scope of this specification.
secureToken	The secure token is the key to connect to the selected 3D Contents Creation Service.
templateId	The template ID indicates a specific template.
num_sil	It indicates the number of the used silhouette image. The value is "1", the template has a front silhouette only. If the value is "3", the template has front, right-side and back silhouettes.
front_sil	The Boolean indicator of the front silhouette is used or not. "TRUE" means the front silhouette is used. "FALSE" means the silhouette is not used.
right_sil	The Boolean indicator of the right-side silhouette is used or not. "TRUE" means the right-side silhouette is used. "FALSE" means the silhouette is not used.

back_sil	The Boolean indicator of the back silhouette is used or not. "TRUE" means the back silhouette is used. "FALSE" means the silhouette is not used.
-----------------	--

Example of the request URL

```
http://exam.3dcapi-server.com:4035/3dcapi/setattribute?serviceId=com.example.3dmodeling&accessToken=1234567
&secureToken="xyxyx"&templateId=13579&num_sil=3&front_sil=TRUE&right_sil=TRUE&back_sil=TRUE
```

When the 3DCAPI Server receives the request, it SHALL run the setting attributes procedure.

The 3DCAPI Server starts the setting attributes procedure, and it SHALL respond as follows:

Definition of the response

Definitions	
MIME-Type	application/json
HTTP status	200 OK

The 3D Contents Creation Server receives the Setting Attributes request from the 3DCAPI Server, and the 3D Contents Creation Server SHALL return the message as follows:

Definition of the data object for the setting attributes response

Name	Sub name	Type	Definition of value	Mandatory/Optional
requestCode		int	The request code coming from the 3DCAPI Server. The code is used for maintaining the session between application and the contents creation server via 3DCAPI Server.	Mandatory
result		int	If success, the value is 0, otherwise an integer other than 0, which indicates an error code. This specification doesn't define error codes.	Mandatory

7.5 SnapShot API

The SnapShot API enables applications to get the status information of the generated 3D modelling progress from the 3D Contents Creation Server with specific time and duration.

7.5.1 Functional Description

The SnapShot request is coming from applications to show user to give the status information of 3D modelling progress.

After the application obtains authorization, the application sends a request to get the snapshot information of the 3D model is under generating. The 3DCAPI Server forwards the request to the selected 3D Contents Creation Server. The 3D Contents Creation Server returns the response of the request with simple results.

The application establishes a websocket between the 3D Content Creation Server and gives accessToken to the server.

The 3D Content Creation Server sends a report with the progress information periodically.

If the application needs to stop receiving the progress information, the application requests to stop to the 3D Contents Creation Server vis 3DCAPI Server. The 3D Contents Creation Server received a request to stop sending the progress information, and the server stops to send the information to the application.

The message flow of the SnapShot is shown in Fig. 7.5.

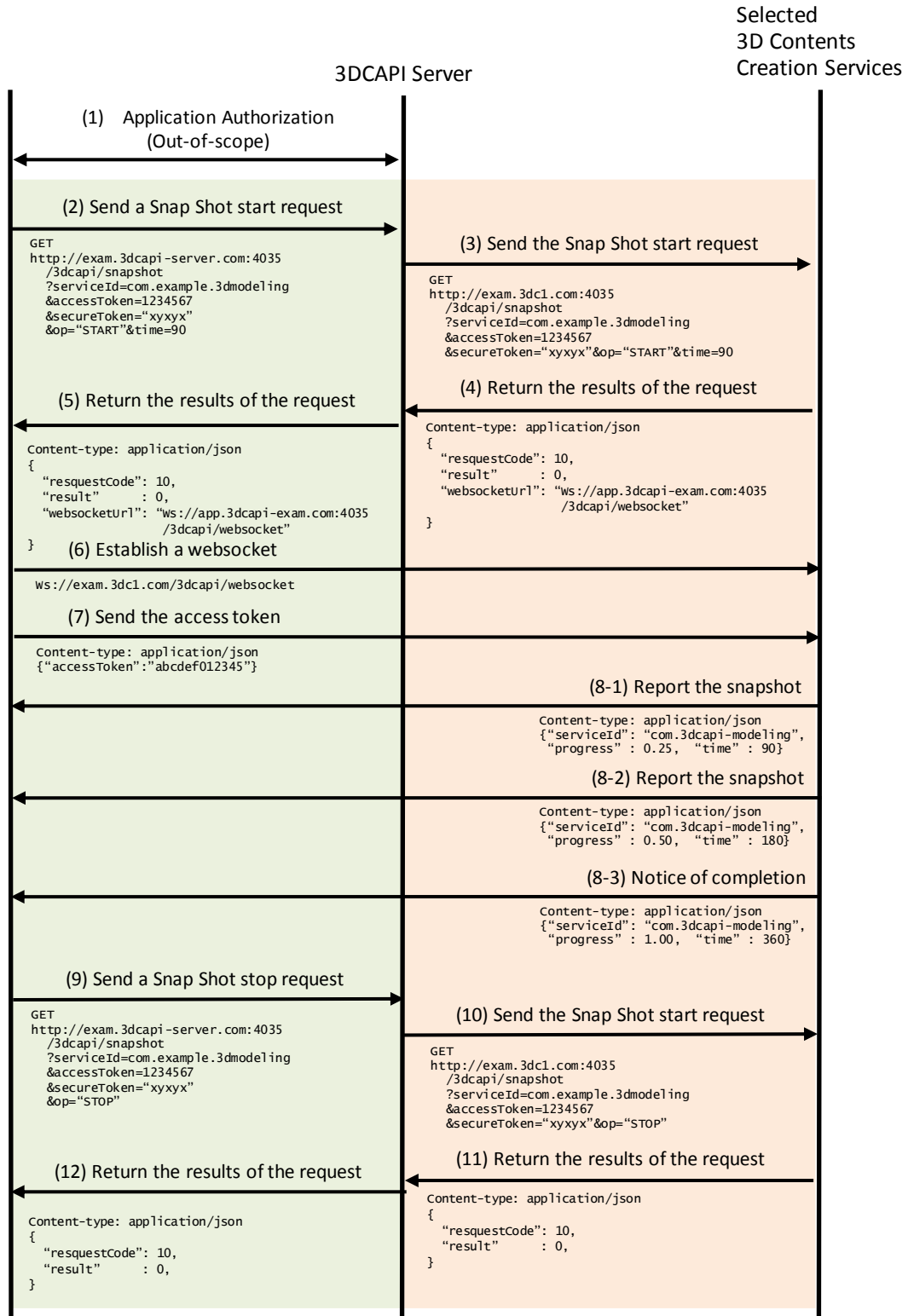


Figure 7.5: Message flow of the SnapShot

The specific data in the message flows in the figure above are defined in 7.5.2 as API definitions.

7.5.2 API Definition

When the 3DCAPI Server receives the start request of the snapshot from an application, the 3DCAPI Server sends the request to the selected 3D Contents Creation Services.

This API provides information about what service is requested to connect. This API is available only if the application authorization, which has a dependency on each 3DCAPI Server implementation.

Definition of the request

Definitions	
Method	HTTP GET (REST)
Request URL	<a &time='90"' href="http://ip.3dcapi-server.addr:4035/3dcapi/snapshot?serviceId=com.example.3dmodeling&accessToken=1234567&secureToken=" xyxyx"&op="START">http://ip.3dcapi-server.addr:4035/3dcapi/snapshot?serviceId=com.example.3dmodeling &accessToken=1234567&secureToken="xyxyx"&op="START"&time=90" <a &time='90"' href="https://ip.3dcapi-server.addr:4035/3dcapi/snapshot?serviceId=com.example.3dmodeling&accessToken=1234567&secureToken=" xyxyx"&op="START">https://ip.3dcapi-server.addr:4035/3dcapi/snapshot?serviceId=com.example.3dmodeling &accessToken=1234567&secureToken="xyxyx"&op="START"&time=90"
Parameters	None

Definition of the request parameters

Parameter name	Definition of value
serviceID	The serviceID of the 3D Contents Creation Service.
accessToken	The access token obtained from the 3DCAPI authentication which is out-of-scope of this specification.
secureToken	The secure token is the key to connect to the selected 3D Contents Creation Service.
op	The operation command to the 3D Contents Creation Service. It could be "START" or "STOP".
time	The time duration between two snapshot slots.

Example of the request URL

[http://exam.3dcapi-server.com:4035/3dcapi/snapshot?serviceId=com.example.3dmodeling&accessToken=1234567
&secureToken="xyxyx"&op="START"&time=90](http://exam.3dcapi-server.com:4035/3dcapi/snapshot?serviceId=com.example.3dmodeling&accessToken=1234567&secureToken=)

When the 3DCAPI Server receives the request, it SHALL run the snapshot procedure.

The 3D Contents Creation Server starts the sending the snapshot information depends on the time duration.:

Definition of the response

Definitions	
MIME-Type	application/json
HTTP status	200 OK

The 3D Contents Creation Server receives the snapshot information request from the 3DCAPI Server, and the 3D Contents Creation Server SHALL return the message as follows:

Definition of the data object for the snapshot response

Name	Sub name	Type	Definition of value	Mandatory/Optional
requestCode		int	The request code coming from the 3DCAPI Server. The code is used for maintaining the session between application and the contents creation server via 3DCAPI Server.	Mandatory
result		int	If success, the value is 0, otherwise an integer other than 0, which indicates an error code. This specification doesn't define error codes.	Mandatory
websocket Ur1		url	The url is used by the websocket connection.	optional

The application received the returned information, establishes a websocket connection to the 3D Contents Creation Services and sends an accessToken to the server.

Definition of the request

Definitions	
Method	HTTP WebSocket
Request URL	ws://exam.3dc1.com/3dcapi/websocket
Parameters	None

Definition of the request parameters

Parameter name	Definition of value
accessToken	The access token obtained from the 3DCAPI authentication which is out-of-scope of this specification.

Example of the request URL

```
ws://exam.3dc1.com/3dcapi/websocket
```

After the websocket is connected, the 3D Contents Creation Server run the snapshot procedure, reports the snapshot information via the websocket.

The server starts the snapshot procedure, and it SHALL respond as follows:

Definition of the response

Definitions	
MIME-Type	application/json
HTTP status	200 OK

The 3D Contents Creation Server SHALL return the message as follows:

Definition of the data object for the snapshot response

Name	Sub name	Type	Definition of value	Mandatory/Optional
serviceId		int	The serviceID of the 3D Contents Creation Service.	Mandatory
progress		float	The percentage value of the progress information of the 3D modelling generating status. If the progress is 1.00, the generating progress is completed, the response is the "Notice of Completion".	Mandatory
time		int	The seconds' value from the start time of the generation 3D model.	Mandatory

When the 3DCAPI Server receives the stop request of the snapshot from the application, the 3DCAPI Server sends the request to the selected 3D Contents Creation Services.

This API provides the information about what service is requested to connect. This API is available only if the application authorization, which has a dependency on each 3DCAPI Server implementation.

Definition of the request

Definitions	
Method	HTTP GET (REST)
Request URL	http://ip.3dcapi-server.addr:4035/3dcapi/snapshot?serviceId=com.example.3dmodeling &accessToken=1234567&secureToken="xyxyx"&op="STOP" https://ip.3dcapi-server.addr:4035/3dcapi/snapshot?serviceId=com.example.3dmodeling &accessToken=1234567&secureToken="xyxyx"&op="STOP"
Parameters	None

Definition of the request parameters

Parameter name	Definition of value
serviceID	The serviceID of the 3D Contents Creation Service.
accessToken	The access token obtained from the 3DCAPI authentication which is out-of-scope of this specification.
secureToken	The secure token is the key to connect to the selected 3D Contents Creation Service.
op	The operation command to the 3D Contents Creation Service. It could be "START" or "STOP".

Example of the request URL

[http://exam.3dcapi-server.com:4035/3dcapi/snapshot?serviceId=com.example.3dmodeling&accessToken=1234567
&secureToken="xyxyx"&op="STOP"](http://exam.3dcapi-server.com:4035/3dcapi/snapshot?serviceId=com.example.3dmodeling&accessToken=1234567&secureToken=)

When the 3DCAPI Server receives the request, it SHALL stop the snapshot procedure.

The 3D Contents Creation Server stops the sending the snapshot information.:

Definition of the response

Definitions

MIME-Type	application/json
HTTP status	200 OK

The 3D Contents Creation Server receives the snapshot information request from the 3DCAPI Server, and the 3D Contents Creation Server SHALL return the message as follows:

Definition of the data object for the snapshot response

Name	Sub name	Type	Definition of value	Mandatory/Optional
requestCode		int	The request code coming from the 3DCAPI Server. The code is used for maintaining the session between application and the contents creation server via 3DCAPI Server.	Mandatory
result		int	If success, the value is 0, otherwise an integer other than 0, which indicates an error code. This specification doesn't define error codes.	Mandatory

7.6 File receive API

The File Receive API enables applications to download the generated 3D model from the 3D Contents Creation Server.

7.6.1 Functional Description

The application requests to download the generated 3D model from the 3D Contents Creation Server, by using the File Receive API.

After the application obtains authorization, the application may be noticed that the 3D modelling process is completed via the SnapShot API.

In this case, the application sends a request to download a file to the 3DCAPI. When the request goes through 3DCAPI Server, and the target server is specified. The 3DCAPI Server forwards the request to the selected 3D Contents Creation Server. The 3D Contents Creation Server returns the response of the request with the information of file receiving.

The application receives the reply and the information from the 3D Contents Creation Server. The application enables a connection to the 3D Contents Creation Server with the information, and downloads the 3D model files. The downloading process itself and protocols are not in the scope of this specification.

The message flow of the File Receive is shown in Fig. 7.6.

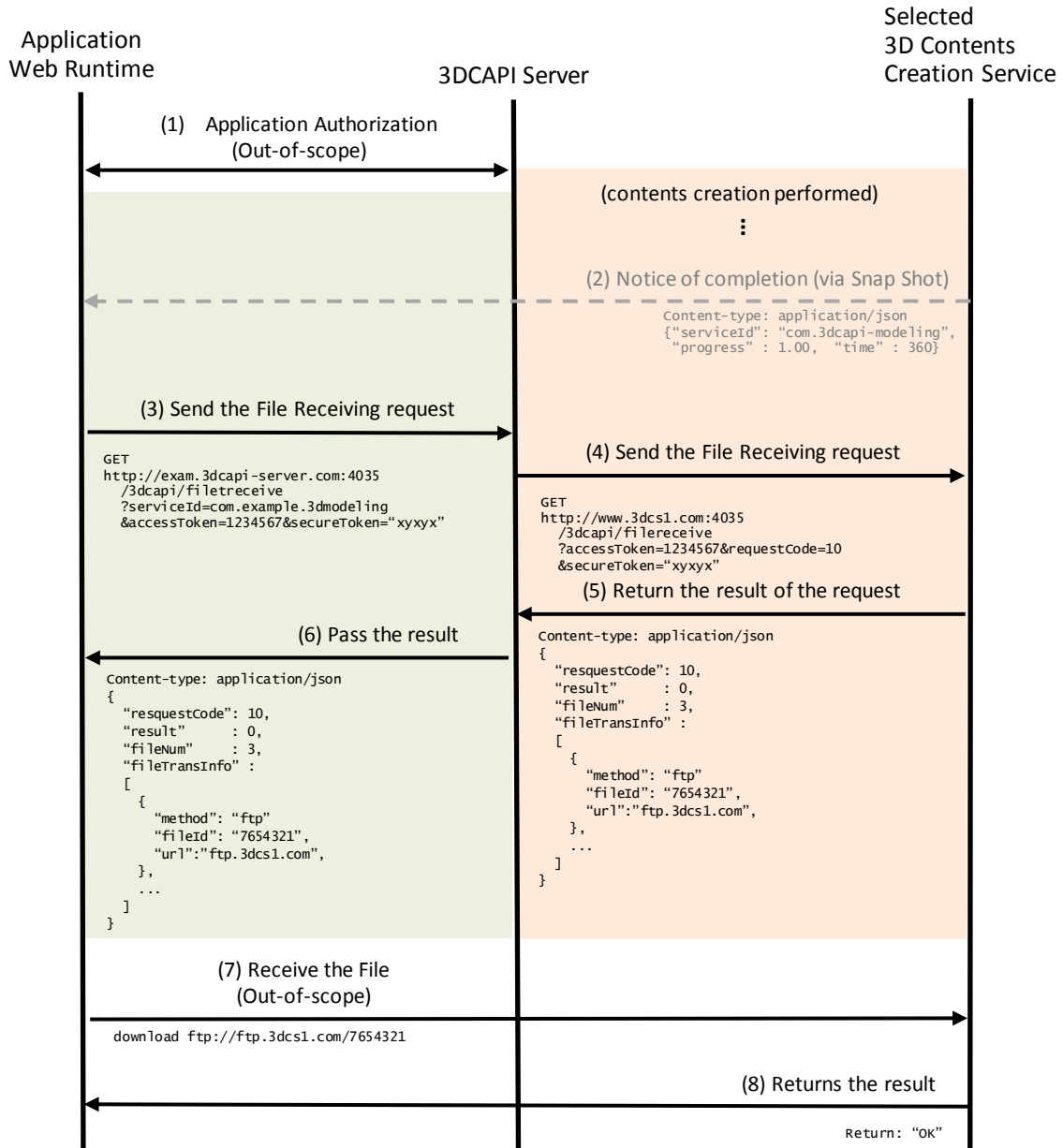


Figure 7.6: Message flow of the File Receive

The specific data in the message flow in the figure above are defined in 7.6.2 as API definitions.

7.6.2 API Definition

When the 3DCAPI Server receives the request of the File Receiving API from an application, the 3DCAPI Server sends the file receive request to the selected 3D Contents Creation Services.

This API provides the information about what service is requested to connect. This API is available only if the application authorization, which has a dependency on each 3DCAPI Server implementation.

Definition of the request

Definitions	
Method	HTTP GET (REST)
Request URL	http://ip.3dcapi-server.addr:4035/3dcapi/filereceive?serviceId=com.example.3dmodeling&accessToken=1234567&secureToken="xyxyx" https://ip.3dcapi-server.addr:4035/3dcapi/filereceive?serviceId=com.example.3dmodeling&accessToken=1234567&secureToken="xyxyx"
Parameters	None

Definition of the request parameters

Parameter name	Definition of value
serviceID	The serviceID.
accessToken	The access token obtained from the 3DCAPI authentication which is out-of-scope of this specification.
secureToken	The secure token is the key to connect to the selected 3D Contents Creation Service.

Example of the request URL

```
http://exam.3dcapi-server.com:4035/3dcapi/filereceive?serviceId=com.example.3dmodeling
&accessToken=1234567&secureToken="xyxyx"
```

When the 3DCAPI Server receives the request, it SHALL run the File Receive procedure.

The 3DCAPI Server completes the file receive procedure, and it SHALL respond as follows:

Definition of the response

Definitions	
MIME-Type	application/json
HTTP status	200 OK

The 3D Contents Creation Server receives the file receive request from the 3DCAPI Server, the 3D Contents Creation Server SHALL return the message as follows:

Definition of the data object for the file Receive response

Name	Sub name	Type	Definition of value	Mandatory/Optional
requestCode		int	The request code coming from the 3DCAPI Server. The code is used for maintaining the session between application and the contents creation server via 3DCAPI Server.	Mandatory
result		int	If success, the value is 0, otherwise an integer other than 0, which indicates an error code. This specification doesn't define error codes.	Mandatory
fileNum		int	The numbers of a file to transferring. The value should be equal to or bigger than 1	Mandatory

fileTrans Info		array		Mandatory
	method	string	The file transferring method between the application and the 3D Contents Creation Service. The method may be "ftp" or "websocket". The method itself is out of the scope of this specification.	Mandatory
	fileId	int	The file ID of the transferred 2D image file. It could be "7654321".	Mandatory
	url	string	The url of the targeted 3D Contents Creation Service. It could be "www.3dcs1.com".	Mandatory

7.7 3D Printing API

The 3D Printing API enables applications to get the generated 3D model from the 3D Contents Creation Server and to print using a 3D printer.

7.7.1 Functional Description

The application requests to download the generated 3D model from the 3D Contents Creation Server and request to print using the 3D printer.

This process is defined in OMA DWAPI-3DP specification. The 3DCAPI does not re-defining the 3D printing and may recommend using the DWAPI-3DP specification.

7.7.2 API Definition

The API definition of 3D printing is out-of-scope of this 3DCAPI specification. The DWAPI-3DP could be adapted to implement this API.

Appendix A. Change History

(Informative)

A.1 Approved Version History

Reference	Date	Description
n/a	n/a	No prior version

A.2 Draft/Candidate Version 1.0 History

Document Identifier	Date	Sections	Description
Draft Versions OMA-ER-3DCAPI-V1_0	25 Oct 2018	All	Skeleton document
	01 Apr 2019	1, 4, 4.1	Incorporates input to committee: OMA-CD-3DCAPI-2018-0003-INP_ER_introduction OMA-CD-3DCAPI-2018-0005-INP_ER_scope
	05 Apr 2019		Incorporates input to committee: OMA-CD-3DCAPI-2019-0002R01-CR_3DCAPI_arch_diagram
	08 Aug 2019	6.2,	Incorporates input to committee: OMA-CD-3DCAPI-2019-0003-CR_3DCAPI_components_description OMA-CD-3DCAPI-2019-0004-CR_3DCAPI_interface_description OMA-CD-3DCAPI-2019-0005R01-CR_UC_service_discovery
	27 Sep 2019	Appendix B	Incorporates input to committee: OMA-CD-3DCAPI-2019-0006R01-CR_UC_service_connecting OMA-CD-3DCAPI-2019-0007-CR_UC_file_transfer OMA-CD-3DCAPI-2019-0008-CR_UC_setting_attributes OMA-CD-3DCAPI-2019-0009-CR_UC_snap_shot OMA-CD-3DCAPI-2019-0010-CR_UC_file_receive
	08 Oct. 2019	5.1, 5.2, 6.1, 6.2, 6.3	Incorporates input to committee: OMA-CD-3DCAPI-2019-0015R01-CR_CR_basic_data_flows OMA-CD-3DCAPI-2019-0016-CR_CR_architecture_change OMA-CD-3DCAPI-2019-0017-CR_CR_component_interface OMA-CD-3DCAPI-2019-0018R01-CR_CR_high_requirements OMA-CD-3DCAPI-2019-0019R01-CR_3DC_specific_requirements
	01 Jul. 2020	7.1	Incorporates input to committee: OMA-CD-3DCAPI-2019-0020R02-CR_Service_Discovery_API
	18 Nov. 2020	2, 3, 7	Incorporates input to committee: OMA-CD-3DCAPI-2020-0050-CR_Service_Discovery_API OMA-CD-3DCAPI-2020-0051-CR_Service_Connecting_API OMA-CD-3DCAPI-2020-0052-CR_File_Transfer_API OMA-CD-3DCAPI-2020-0053-CR_Setting_Attributes_API OMA-CD-3DCAPI-2020-0054-CR_Snap_Shot_API OMA-CD-3DCAPI-2020-0055-CR_File_Receive_API OMA-CD-3DCAPI-2020-0056-CR_3D_Printing_API OMA-CD-3DCAPI-2020-0057-CR_Reference OMA-CD-3DCAPI-2020-0058-CR_Conventions OMA-CD-3DCAPI-2020-0059-CR_definitions OMA-CD-3DCAPI-2020-0060-CR_Abbreviations
	25 Jan. 2021		Incorporates CR OMA-CD-2021-0001-CR-gating_criteria_editorial_updates
Candidate Versions OMA-ER-3DCAPI-V1_0	10 Feb. 2021	n/a	Status Changed to Candidate by Working Group Ref# OMA-CD-2021-0002-INP_OMA-ER-3DCAPI-V-1_0_for_Candidate_Approval

Appendix B. Use Cases (Informative)

B.1 Service Discovery use case

The service discovery is an essential function to find useful services for the application.

B.1.1 Short Description

An application obtains authorization for access to 3DCAPIs, sends the Service Discovery request to the 3DCAPI Server. Then the 3DCAPI Server sends the Service Discovery request to all of the 3D Contents Creation Services. The message flow of the Service Discovery is shown below.

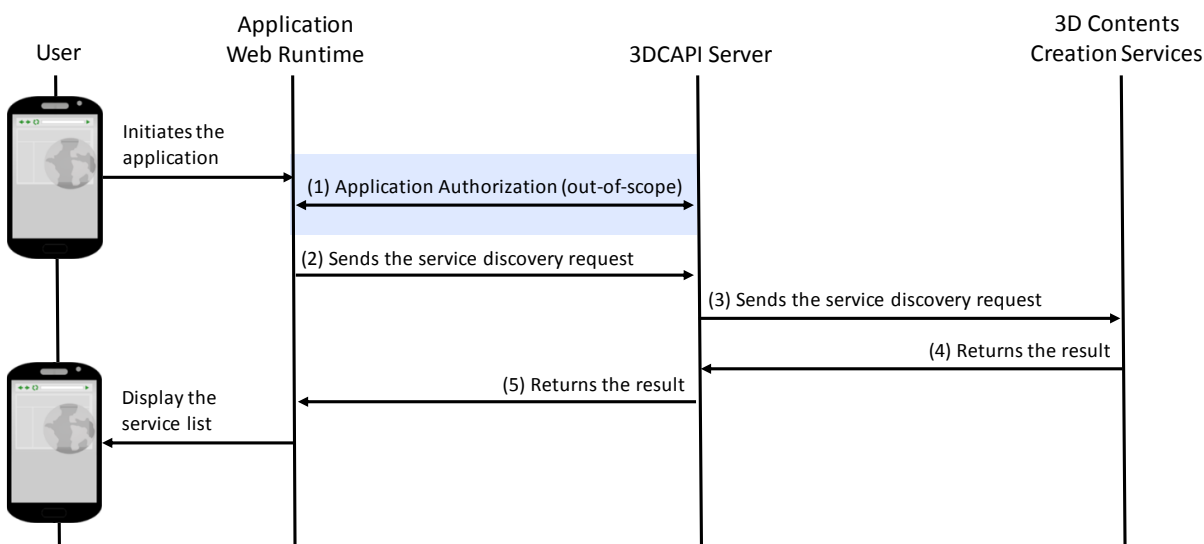


Figure B-1: Message flow of the Service Discovery

- (1) An application seeks access rights from an authentication server and gets authorization to access the 3DCAPI Server. The authentication and authorization process is not in the scope of 3DCAPI.
- (2) The application sends the service discovery request to the 3DCAPI Server.
- (3) The 3DCAPI Server relays the service discovery request to 3D Contents Creation Services which are registered in 3DCAPI Server.
- (4) The 3D Contents Creation Services reply their service lists to the 3DCAPI Server.
- (5) The 3DCAPI Server responds the service lists to the application as the response of the request from the application.

B.1.2 Market benefits

The service discovery use case enables a multi-service environment, and applications could have a choice from the lists of 3D Contents Creation Service.

B.2 Service Connecting use case

The service connecting is an essential function to connect and is a useful service for the application.

B.2.1 Short Description

An application obtains authorization for access to 3DCAPIs and has selected service to connect. The application sends a Service Connect request to the 3DCAPI Server. Then the 3DCAPI Server sends the Service Connect request to the selected 3D Contents Creation Service. The message flow of the Service Connecting is shown below.

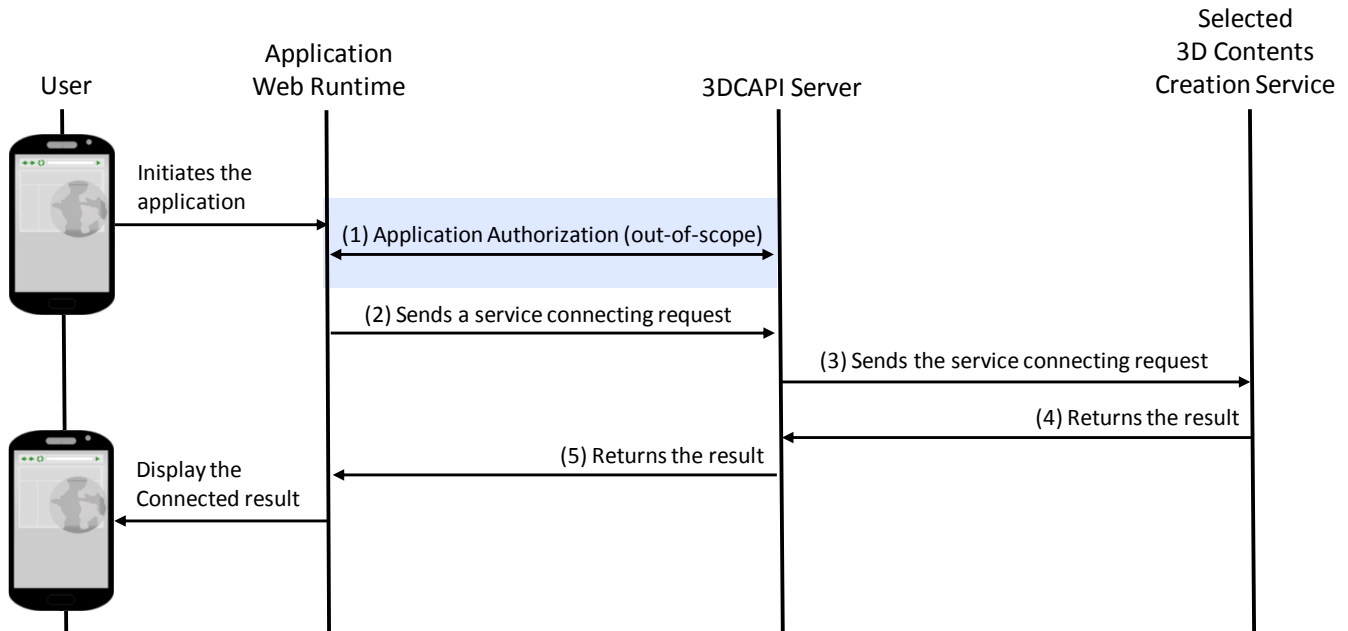


Figure B-2: Message flow of the Service Connecting

- (1) An application seeks access rights from an authentication server and gets authorization to access the 3DCAPI Server. The authentication and authorization process is not in the scope of 3DCAPI. The application has selected a service to connect.
- (2) The application sends a service connecting request for the selected service to the 3DCAPI Server.
- (3) The 3DCAPI Server relays the service connecting request to the selected 3D Contents Creation Service which are registered in 3DCAPI Server.
- (4) The 3D Contents Creation Service reply its result of connecting information to the 3DCAPI Server.
- (5) The 3DCAPI Server sends the information to the application as the response of the request.

B.2.2 Market benefits

The service connecting use case enables to connect a suitable 3D Contents Creation Service, and applications could be a status to use 3D Contents Creation Service.

B.3 File Transfer use case

The file transfer is an essential function to transform contents using the 3D Contents Creation Service for the application. The transmitted files are used as original images to create 3D contents.

B.3.1 Short Description

An application obtains authorization for access to 3DCAPIs and has selected service to connect. The application sends a File Transfer request to the 3DCAPI Server. Then the 3DCAPI Server sends the request to the selected 3D Contents Creation Service. The message flow of the File Transfer is shown below.

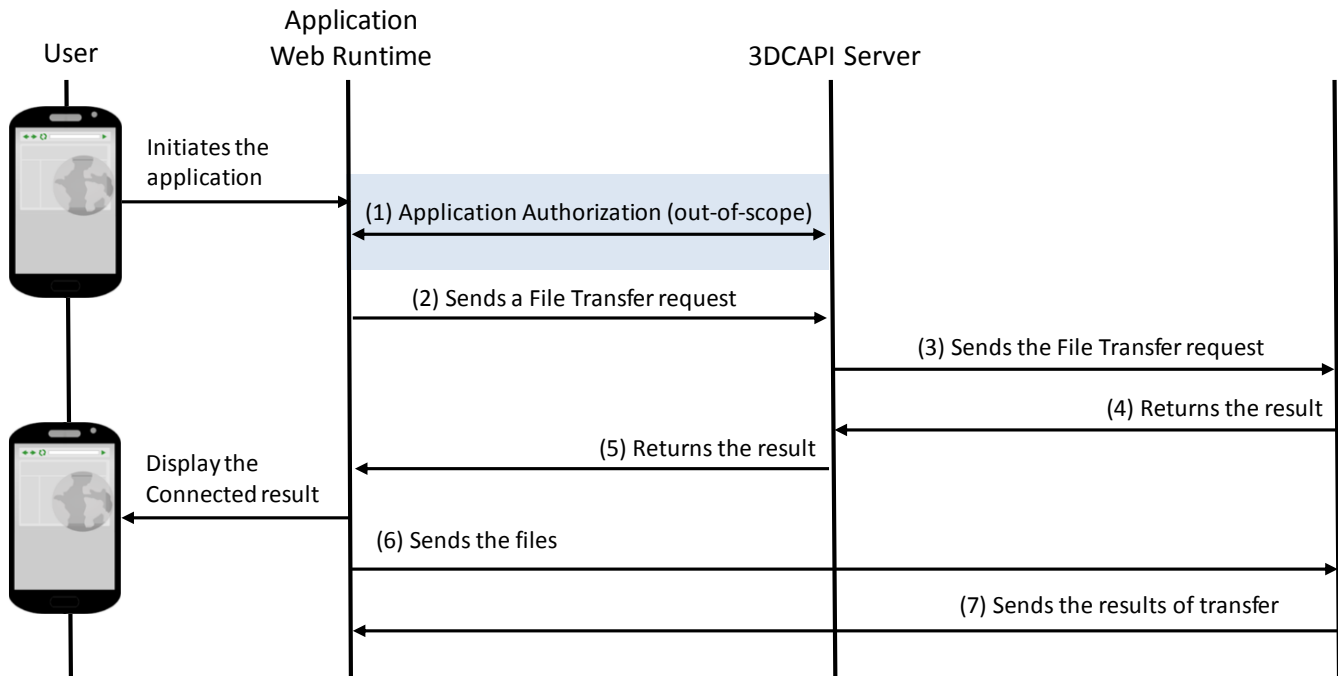


Figure B-3: Message flow of the File Transfer

- (1) An application seeks access rights from an authentication server and gets authorization to access the 3DCAPI Server. The authentication and authorization process is not in the scope of 3DCAPI. The application has selected a service to connect. The application has connected to the service.
- (2) The application sends a File Transfer request for the selected service to the 3DCAPI Server.
- (3) The 3DCAPI Server relays the File Transfer request to the selected 3D Contents Creation Service which are registered in 3DCAPI Server.
- (4) The 3D Contents Creation Service reply its result with the file transfer information to the 3DCAPI Server.
- (5) The 3DCAPI Server sends the information to the application as the response of the request.
- (6) The application is initiating file transfer to the selected service using the information from the service.
- (7) The service sends the results of the transfer.

B.3.2 Market benefits

The File Transfer use case enables to send original contents to the 3D Contents Creation Service, and the service could create 3D contents using the original contents.

B.4 Attributes Setting use case

The attributes setting is an essential function to adjust options to create a process of the 3D Contents Creation Service to provide customized contents creation. The transmitted files are used as original images to create 3D contents.

B.4.1 Short Description

An application obtains authorization for access to 3DCAPIs and has selected service to connect. The application sends an Attributes Setting request to the 3DCAPI Server. Then the 3DCAPI Server sends the request to the selected 3D Contents Creation Service. The message flow of the Attributes Setting is shown below.

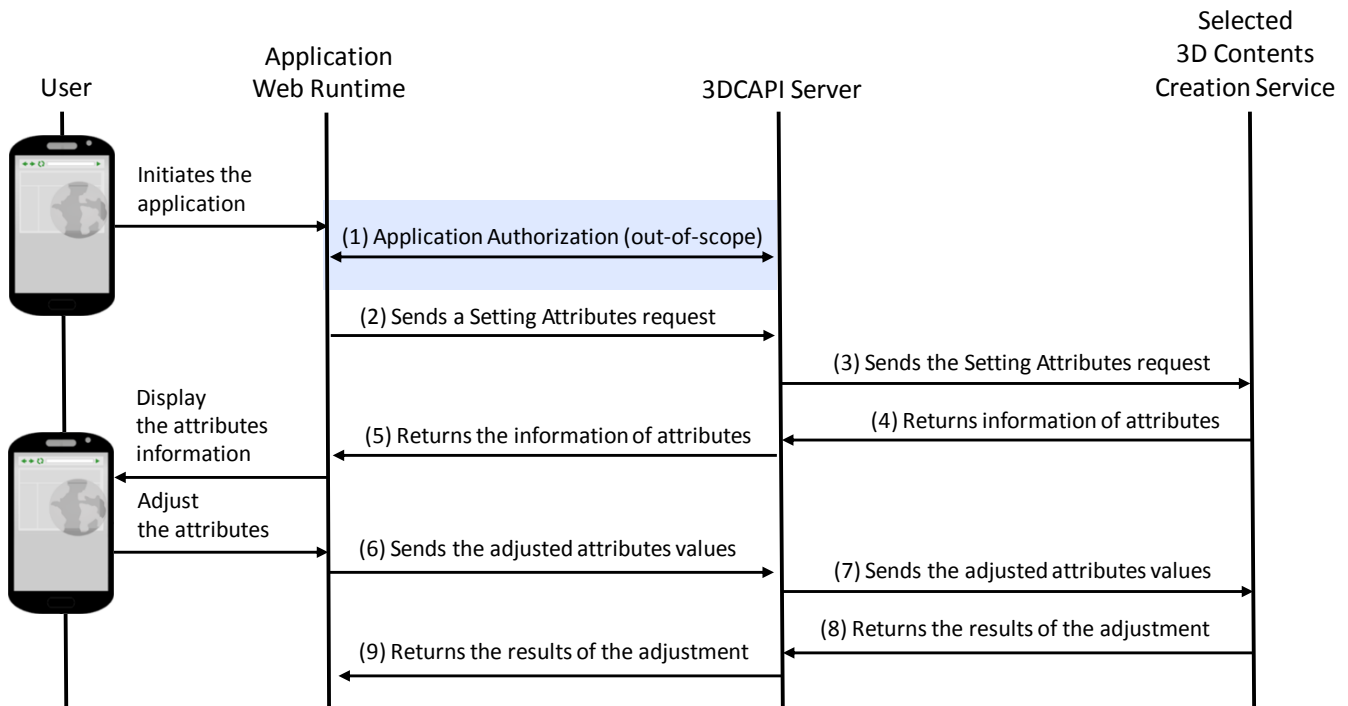


Figure B-4: Message flow of the Attributes Setting

- (1) An application seeks access rights from an authentication server and gets authorization to access the 3DCAPI Server. The authentication and authorization process is not in the scope of 3DCAPI. The application has selected a service to connect. The application has connected to the service.
- (2) The application sends an Attributes Setting request for the selected service to the 3DCAPI Server.
- (3) The 3DCAPI Server relays the Attributes Setting request to the selected 3D Contents Creation Service which are registered in 3DCAPI Server.
- (4) The 3D Contents Creation Service reply its result with the attributes setting information to the 3DCAPI Server.
- (5) The 3DCAPI Server returns the information to the application as the response of the request.
- (6) The application displays the information to the user and gets the adjusted value of the attributes. The application sends the adjusted attributes values to the 3DCAPI Server.
- (7) The 3DCAPI Server sends the values to the selected 3D Contents Creation Service.
- (8) The service returns the results of the adjustment to the 3DCAPI Server and starts to a contents creation process.
- (9) The 3DCAPI Server responses the results of the adjustment to the application.

B.4.2 Market benefits

The Attributes Setting use case enables to control the 3D Contents Creation Service by the application.

B.5 SnapShot use case

The SnapShot is an optional function to inform the status of a creative process of the 3D Contents Creation Service to the user.

B.5.1 Short Description

An application obtains authorization for access to 3DCAPIs and has selected service to connect. The application has sent an Attributes Setting request to the 3DCAPI Server to start creating 3D contents. After that, the application sends a SnapShot request to the 3DCAPI Server to request snapshots from the service. Then the 3DCAPI Server sends the request to the selected 3D Contents Creation Service. The message flow of the SnapShot is shown below.

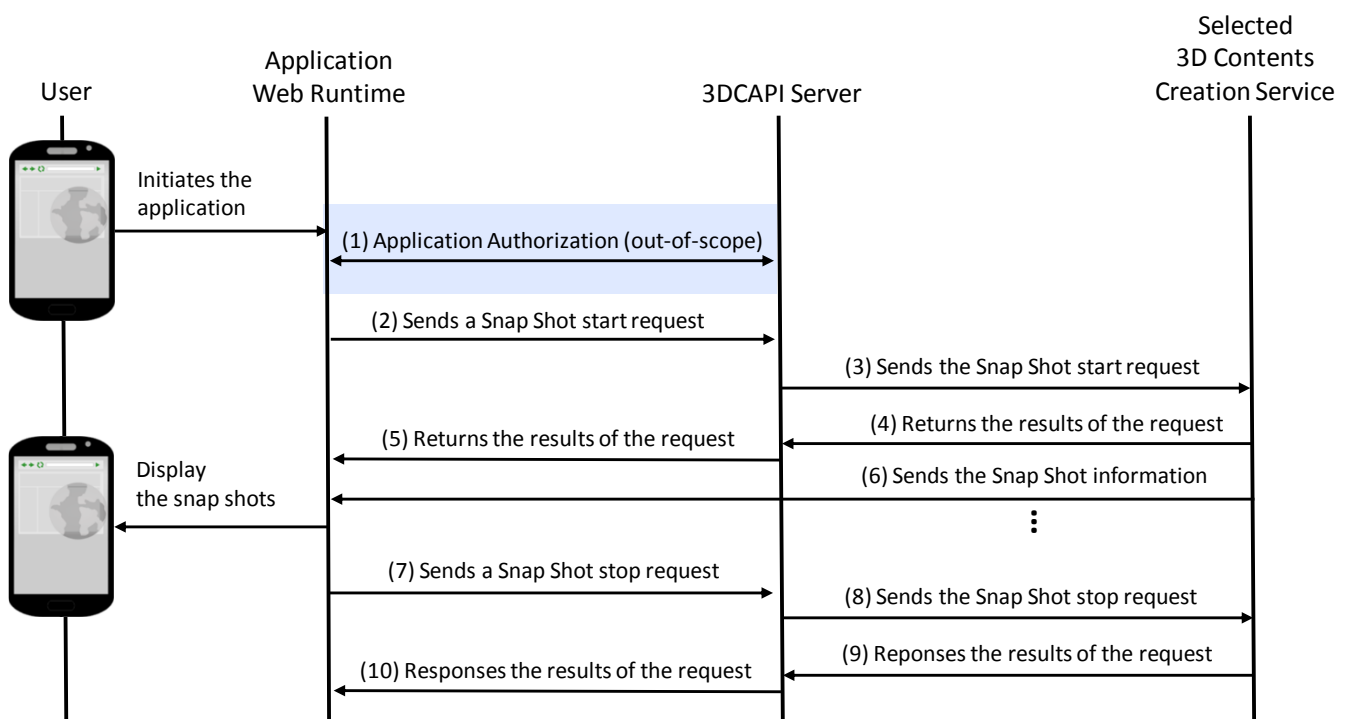


Figure B-5: Message flow of the SnapShot

- (1) An application seeks access rights from an authentication server and gets authorization to access the 3DCAPI Server. The authentication and authorization process is not in the scope of 3DCAPI. The application has selected a service to connect. The application has connected to the service.
- (2) The application sends a SnapShot request for the selected service to the 3DCAPI Server.
- (3) The 3DCAPI Server relays the SnapShot request to the selected 3D Contents Creation Service which are registered in 3DCAPI Server.
- (4) The 3D Contents Creation Service reply its result with the information of receiving snapshots to the 3DCAPI Server.
- (5) The 3DCAPI Server sends the information to the application as the response of the request.
- (6) The service sends the snapshots to the application till the creation process is completed. The application displays the snapshot information to the user.

- (7) If it is needed, the application sends a SnapShot Stop request to the 3DCAPI Server to stop receiving the snapshots.
- (8) The 3DCAPI Server sends the SnapShot stop request to the service.
- (9) The service stops sending the snapshots and responses the result of the request to the 3DCAPI Server.
- (10) The 3DCAPI Server responses the result to the application.

B.5.2 Market benefits

The SnapShot use case enables to provide information on the status of the contents creation process of the 3D Contents Creation Service to the user.

B.6 File Receiving use case

The File Receiving is an essential function to receive contents from the 3D Contents Creation Service as the result of the creating process.

B.6.1 Short Description

An application obtains authorization for access to 3DCAPIs and has selected service to connect. The application has sent an Attributes Setting request to the 3DCAPI Server to start creating 3D contents.

When the 3D Contents Creation Service has performed and done with the creation process, the service sends a notice of completion to the 3DCAPI server. After that, the application could receive the contents from the service

the application sends a SnapShot request to the 3DCAPI Server to request snapshots from the service. Then the 3DCAPI Server sends the request to the selected 3D Contents Creation Service. The message flow of the SnapShot is shown below.

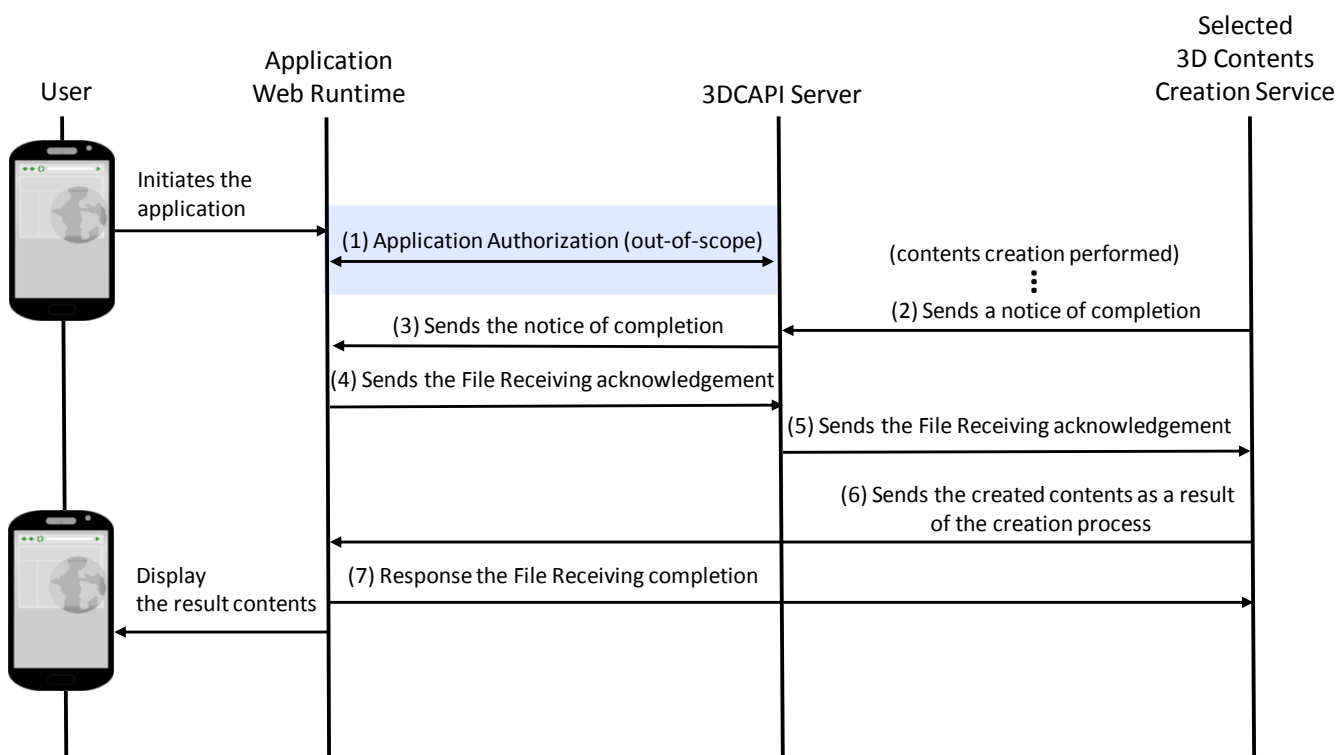


Figure B-6: Message flow of the File Receiving

- (1) An application seeks access rights from an authentication server and gets authorization to access the 3DCAPI Server. The authentication and authorization process is not in the scope of 3DCAPI. The application has selected a service to connect. The application has connected to the service and request to start the creation process to the 3D Contents Creation Service.
- (2) The service has done with the contents creation process. The service sends a notice of completion to the 3DCAPI Server with a file receiving information.
- (3) The 3DCAPI Server relays the notice to the application.
- (4) The application sends a File Receiving acknowledgement to the 3DCAPI Server.
- (5) The 3DCAPI Server sends the acknowledgements to the service.
- (6) The service sends 3D contents as the result of the creation process to the application.
- (7) The application response the File Receiving completion after the completion of receiving the 3D contents and display the 3D contents to the user.

B.6.2 Market benefits

The File Receiving use case enables to receive the result from the 3D Contents Creation Service.