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Contents

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This Technical Specification has been produced by the 3rd Generation Partnership Project (3GPP).

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of the present document, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

Version x.y.z

where:

x the first digit:

1 presented to TSG for information;

2 presented to TSG for approval;

3 or greater indicates TSG approved document under change control.

y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.

z the third digit is incremented when editorial only changes have been incorporated in the document.

In the present document, modal verbs have the following meanings:

shall indicates a mandatory requirement to do something

shall not indicates an interdiction (prohibition) to do something

The constructions "shall" and "shall not" are confined to the context of normative provisions, and do not appear in Technical Reports.

The constructions "must" and "must not" are not used as substitutes for "shall" and "shall not". Their use is avoided insofar as possible, and they are not used in a normative context except in a direct citation from an external, referenced, non-3GPP document, or so as to maintain continuity of style when extending or modifying the provisions of such a referenced document.

should indicates a recommendation to do something

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need not indicates permission not to do something

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can indicates that something is possible

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will indicates that something is certain or expected to happen as a result of action taken by an agency the behaviour of which is outside the scope of the present document

will not indicates that something is certain or expected not to happen as a result of action taken by an agency the behaviour of which is outside the scope of the present document

might indicates a likelihood that something will happen as a result of action taken by some agency the behaviour of which is outside the scope of the present document

might not indicates a likelihood that something will not happen as a result of action taken by some agency the behaviour of which is outside the scope of the present document

In addition:

is (or any other verb in the indicative mood) indicates a statement of fact

is not (or any other negative verb in the indicative mood) indicates a statement of fact

The constructions "is" and "is not" do not indicate requirements.

1 Scope

The present document specifies the stage 3 protocol and data model for the Nmf Service Based Interface. It provides stage 3 protocol definitions and message flows, and specifies the API for each service offered by the Media Function (MF).

The 5G System stage 2 architecture and procedures are specified in 3GPP TS 23.501 [2] and 3GPP TS 23.502 [3].

The IP Multimedia Subsystem (IMS) Data Channel (DC) architecture and procedures are specified in annex AC of 3GPP TS 23.228 [14].

The Technical Realization of the Service Based Architecture and the Principles and Guidelines for Services Definition are specified in 3GPP TS 29.500 [4] and 3GPP TS 29.501 [5].

2 References

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

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.

- For a specific reference, subsequent revisions do not apply.

- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[1]   3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

[2]   3GPP TS 23.501: "System Architecture for the 5G System; Stage 2".

[3]   3GPP TS 23.502: "Procedures for the 5G System; Stage 2".

[4]   3GPP TS 29.500: "5G System; Technical Realization of Service Based Architecture; Stage 3".

[5]   3GPP TS 29.501: "5G System; Principles and Guidelines for Services Definition; Stage 3".

[6]   OpenAPI: "OpenAPI Specification Version 3.0.0", https://spec.openapis.org/oas/v3.0.0.

[7]   3GPP TR 21.900: "Technical Specification Group working methods".

[8]   3GPP TS 33.501: "Security architecture and procedures for 5G system".

[9]   IETF RFC 6749: "The OAuth 2.0 Authorization Framework".

[10]   3GPP TS 29.510: "5G System; Network Function Repository Services; Stage 3".

[11]   IETF RFC 7540: "Hypertext Transfer Protocol Version 2 (HTTP/2)".

[12]   IETF RFC 8259: "The JavaScript Object Notation (JSON) Data Interchange Format".

[13]   IETF RFC 7807: "Problem Details for HTTP APIs".

[14]   3GPP TS 23.228: "IP Multimedia Subsystem (IMS); Stage 2".

[15]   IETF RFC 6902: " JavaScript Object Notation (JSON) Patch".

[16]   3GPP TS 29.571: "5G System; Common Data Types for Service Based Interfaces Stage 3".

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in 3GPP TR 21.905 [1], 3GPP TS 23.228 [14] and the following apply. A term defined in the present document or in 3GPP TS 23.228 [14] takes precedence over the definition of the same term, if any, in 3GPP TR 21.905 [1].

3.2 Symbols

For the purposes of the present document, the following symbols given in 3GPP TS 23.228 [14] apply:

DC2   Reference point between MF and IMS AS
MDC1   Reference point between MF and DCSF
MDC2   Reference point either MF and DC Application Server or AR Application Server

3.3 Abbreviations

For the purposes of the present document, the abbreviations given in 3GPP TR 21.905 [1], 3GPP TS 23.228 [14] and the following apply. An abbreviation defined in the present document or 3GPP TS 23.228 [14] takes precedence over the definition of the same abbreviation, if any, in 3GPP TR 21.905 [1].

AR   Augmented Reality
DTLS   Datagram Transport Layer Security
MF   Media Function
IMS AS   IP Multimedia Subsystem Application Server

4 Overview

Within the IMS DC architecture, the MF offers services to the IMS AS via the Nmf service based interface (see 3GPP TS 23.228 [14]).

Figure 4.1-1 provides the reference model (in service-based interface representation and in reference point representation), with focus on the MF services.
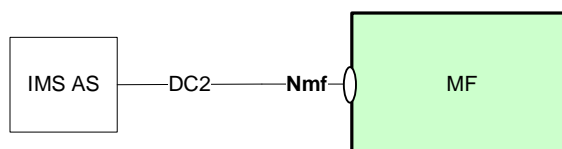
Figure 4.1-1: Reference model – MF

DC2 is the reference point between MF and IMS AS.

5 Services offered by the MF

5.1 Introduction

The MF offers the following services via the Nmf interface:

- Nmf_MediaResourceManagement (MRM) Service

Table 5.1-1 summarizes the corresponding APIs defined for this specification.

Table 5.1-1: API Descriptions

Service Name	Clause	Description	OpenAPI Specification File	apiName	Annex
Nmf_MRM	6.1	Nmf Media Resource Management Service	TS29176_Nmf_MRM.yaml	nmf-mrm	A.2

5.2 Nmf_MediaResourceManagement (MRM) Service

5.2.1 Service Description

The Nmf_MRM service as defined in 3GPP TS 23.228 [14] is provided by the Media Function (MF). This service enables the consumer to create, update and delete media resources. Data Channel (DC) and Augmented Reality (AR) are two capabilities supported by MF.

The media resource represents a media context including one or multiple media terminations. A media termination includes media resources for one or multiple medias on the Mb interface. When a media pass through the MF, there is one termination for the input stream and one termination for the output stream.

5.2.2 Service Operations

5.2.2.1 Introduction

The Nmf_MRM service supports the following service operation.

Table 5.2.2.1-1: Service operations supported by the Nmf_MRM service

Service Operations	Description	Operation Semantics	Example Consumer(s)
Create	Create a new media context including one or multiple media terminations.	Request/Response	IMS AS
Update	Update the one or multiple existing media resources within a specific media context.	Request/Response	IMS AS
Delete	Delete a specific media context including all the existing terminations and medias.	Request/Response	IMS AS

5.2.2.2 Nmf_MRM_Create Service Operation

5.2.2.2.1 General

The Nmf_MRM_Create service operation is used by an NF service consumer to create a media context including one or multiple terminations and reserve media resources for anchoring one or multiple medias of Mb interface in each

termination on MF. The consumer NF may also include application function (e.g. DCSF, DC AS) specification information requested by the application layer to be applied on the media by the MF.

5.2.2.2.2 Creation of a new media context

The NF service consumer shall request a new context by using HTTP method POST with "{apiRoot}/nmf/<apiVersion>/contexts" as resource URI representing the "Contexts Collection", see clause 6.1.3.2.
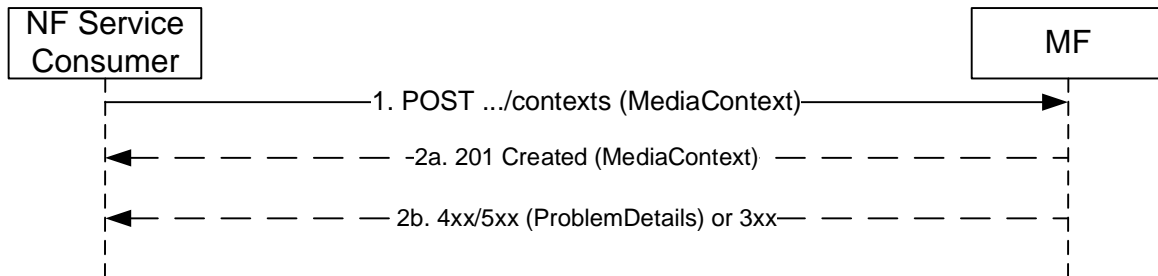
Figure 5.2.2.2.2-1 Creation of a media context

1. The NF Service Consumer shall send a POST request to create an "Individual Context" resource in the MF. The payload body of the POST request shall contain a representation of the individual context resource to be created.

   The NF service consumer shall include list of termination descriptors in the HTTP message body. Each termination descriptor shall include list of media stream descriptors. Each media stream descriptor shall include:

   - Media ID, i.e. a unique identity of the media stream within the media context instance;

   - Remote Mb specifications, i.e. the media stream IP address and port allocated at the remote endpoint, i.e. remote UE, remote network.

   - Media resource description, which includes

     1) Media resource type, e.g. DC, AR.

     2) If media resource type is set to "DC", the DC media specification shall be included. The DC media specification shall include:

        a) Data Channel Mapping and Configuration information when originating/terminating data channel media flows on the Mb interface. It shall include the SCTP stream Id for the DC, and may include subprotocol, order, maxRetry, maxTime and priority may be included.

        b) Maximum Message Size, which represents the maximum size to be expected.

        c) Data Channel Port, which represents the port of SCTP port for the Data Channel.

        d) Security Setup, which identifies the security setup of the DTLS connection.

        e) Security Certificate Fingerprint, which identifies the security certificate fingerprint.

        f Security Transport Identity, which identifies transport layer identity.

     For establishing bootstrap data channel or P2A/A2P application data channel, the following parameters shall be included:

        a) media proxy configuration applicable to the media flow;

        b) remote MDC1/MDC2 media specification information to be applied on the media by the MF;

        c) Replacement HTTP URL for each streamId allocated by the application layer representing the application list (e.g. graphical user interface) offered to the IMS subscriber via the MDC1 interface.

3) If media resource type is set to "AR", the AR media resource description shall be included, which includes:

   a) Media processing specification.

2a. Upon the reception of the HTTP POST request, if the request is accepted and no error occur, the MF shall:

   - create a new media context;

   - assign a media contextId;

   - assign a terminationId for each termination descriptor; and

   - reserve media resources for each mediaId.

   The MF shall include a HTTP Location header to provide the location of a newly created resource (MediaContext) together with the status code 201 indicating the requested resource is created in the response message.

2b. On failure, one of the HTTP status code listed in Table 6.1.3.2.3.1-3 shall be returned. For a 4xx/5xx response, the message body shall contain a ProblemDetails structure with the "cause" attribute set to one of the application errors listed in Table 6.1.3.2.3.1-3.

   On redirection, the MF shall include 3xx status code, which shall contain a Location header with an URI pointing to the endpoint to another MF (service) instance.

5.2.2.3 Nmf_MRM_Update Service Operation

5.2.2.3.1 General

The Nmf_MRM_Update service operation is used by an NF service consumer to update one or multiple existing media resources within a specific media context on MF. Terminations and/or Medias can be added, modified, or deleted within an Update request.

5.2.2.3.2 Updating an existing media context

The NF Service Consumer shall modify the context by using HTTP method PATCH with the URI "{apiRoot}/nmf/<apiVersion>/contexts/{contextId}" as resource URI representing the "Individual Context ", see clause 6.1.3.3.
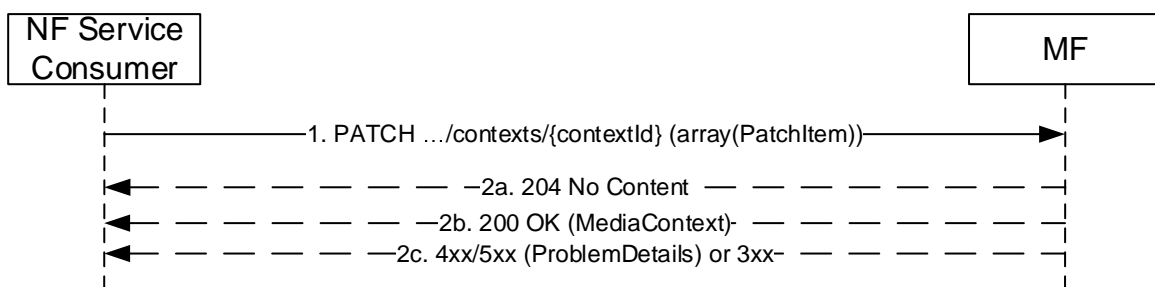
Figure 5.2.2.3.2-1 Update a media context

1. The NF Service Consumer shall send a PATCH request to modify a context resource in the MF. The modification may be for adding, updating or deleting terminations of the existing media context.

   For adding, removing or updating a termination in an existing MediaContext, the payload body of the PATCH request shall contain an "add", "remove" or "replace" PATCH operation respectively, with one item of the attribute "terminations" of the MediaContext.

2a. On success, if the change is to delete the existing termination and MF accepts the request change, the MF shall return the status code 204 No Content.

2b. On success, if the change is to add a new termination or to update the existing termination and MF accepts the request change, the MF shall return the status code 200 OK. The response shall contain the new resource representation of the resource Individual Context, which includes the added and modified resource or its sub-resource.

2c On failure, one of the HTTP status code listed in Table 6.1.3.3.3.1-3 indicating the error shall be returned. For a 4xx/5xx response, the message body shall contain a ProblemDetails structure with the "cause" attribute set to one of the application errors listed in Table 6.1.3.3.3.1-3.

On redirection, the MF shall return 3xx status code, which shall contain a Location header with an URI pointing to the endpoint to another MF (service) instance.

5.2.2.4 Nmf_MRM_Delete Service Operation

5.2.2.4.1 General

The Nmf_MRM_Delete service operation is used by an NF service consumer to delete an existing media context including all existing terminations and medias on MF previously created by itself.

5.2.2.4.2 Deleting an existing media context

The NF Service Consumer shall delete an existing context by using HTTP method DELETE with the URI "{apiRoot}/nmf/<apiVersion>/contexts/{contextId}" as resource URI representing the "Individual Context ", see clause 6.1.3.3.
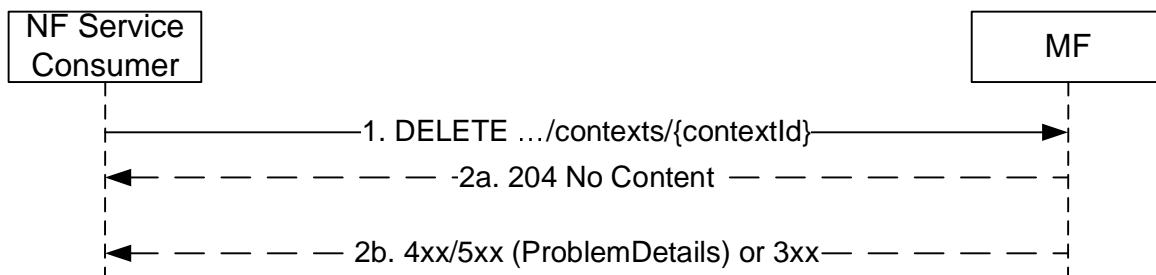
Figure 5.2.2.4.2-1 Delete a media context

1. The NF Service Consumer shall send a DELETE request to delete an existing context resource in the MF.

2a. On success, the request is accepted, the MF shall reply with the status code 204 No Content indicating the resource identified by context ID is successfully deleted in the response message.

2b. On failure, one of the HTTP status code listed in Table 6.1.3.3.3.2-3 indicating the error shall be returned. For a 4xx/5xx response, the message body shall contain a ProblemDetails structure with the "cause" attribute set to one of the application errors listed in Table 6.1.3.3.3.2-3.

On redirection, the MF shall return 3xx status code, which shall contain a Location header with an URI pointing to the endpoint to another MF (service) instance.

6 API Definitions

6.1 Nmf_MRM Service API

6.1.1 Introduction

The Nmf_MRM service shall use the Ndcmf_MRM API.

The API URI of the Nmf_MRM API shall be:

{apiRoot}/<apiName>/<apiVersion>

The request URIs used in HTTP requests from the NF service consumer towards the NF service producer shall have the Resource URI structure defined in clause 4.4.1 of 3GPP TS 29.501 [5], i.e.:

{apiRoot}/<apiName>/<apiVersion>/<apiSpecificResourceUriPart>

with the following components:

- The {apiRoot} shall be set as described in 3GPP TS 29.501 [5].

- The <apiName> shall be " nmf_mrm".

- The <apiVersion> shall be "v1".

- The <apiSpecificResourceUriPart> shall be set as described in clause 6.1.3.

6.1.2 Usage of HTTP

6.1.2.1 General

HTTP/2, IETF RFC 7540 [11], shall be used as specified in clause 5 of 3GPP TS 29.500 [4].

HTTP/2 shall be transported as specified in clause 5.3 of 3GPP TS 29.500 [4].

The OpenAPI [6] specification of HTTP messages and content bodies for the Nmf_MRM API is contained in Annex A.

6.1.2.2 HTTP standard headers

6.1.2.2.1 General

See clause 5.2.2 of 3GPP TS 29.500 [4] for the usage of HTTP standard headers.

6.1.2.2.2 Content type

JSON, IETF RFC 8259 [12], shall be used as content type of the HTTP bodies specified in the present specification as specified in clause 5.4 of 3GPP TS 29.500 [4]. The use of the JSON format shall be signalled by the content type "application/json".

"Problem Details" JSON object shall be used to indicate additional details of the error in a HTTP response body and shall be signalled by the content type "application/problem+json", as defined in IETF RFC 7807 [13].

The use of JSON Patch (IETF RFC 6902 [15]) format in a HTTP request body shall be signaled by the content type "application/json-patch+json".

6.1.2.3 HTTP custom headers

The mandatory HTTP custom header fields specified in clause 5.2.3.2 of 3GPP TS 29.500 [4] shall be supported, and the optional HTTP custom header fields specified in clause 5.2.3.3 of 3GPP TS 29.500 [4] may be supported.

6.1.3 Resources

6.1.3.1 Overview

This clause describes the structure for the Resource URIs and the resources and methods used for the service.

Figure 6.1.3.1-1 depicts the resource URIs structure for the Nmf_MRM API.
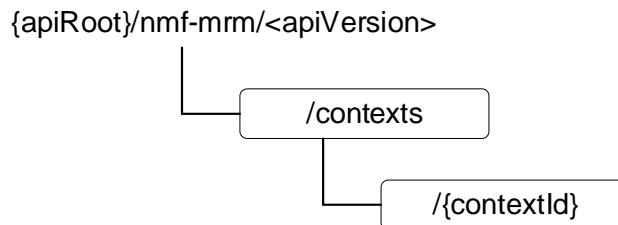
Figure 6.1.3.1-1: Resource URI structure of the Nmf_MRM API

Table 6.1.3.1-1 provides an overview of the resources and applicable HTTP methods.

Table 6.1.3.1-1: Resources and methods overview

Resource purpose/name	Resource URI (relative path after API URI)	HTTP method or custom operation	Description (service operation)
Contexts Collection	/contexts	POST	Creates a new Individual Context resource.
Individual Context	/contexts/{contextId}	PATCH	Updates an existing Individual Context resource identified by {contextId}
		DELETE	Deletes an existing Individual Context resource identified by {contextId}.

6.1.3.2 Resource: Contexts Collection

6.1.3.2.1 Description

The Contexts Collection resource represents a collection of contexts created by NF service consumers of Nmf_MRM service at a given MF. The resource is modelled as Collection resource archetype (see clause C.2 of 3GPP TS 29.501 [2]).

6.1.3.2.2 Resource Definition

Resource URI: **{apiRoot}/ nmf_mrm/<apiVersion>/contexts**

This resource shall support the resource URI variables defined in table 6.1.3.2.2-1.

Table 6.1.3.2.2-1: Resource URI variables for this resource

Name	Data type	Definition
apiRoot	string	See clause 6.1.1

6.1.3.2.3 Resource Standard Methods

6.1.3.2.3.1 POST

This method shall support the URI query parameters specified in table 6.1.3.2.3.1-1.

Table 6.1.3.2.3.1-1: URI query parameters supported by the POST method on this resource

Name	Data type	P	Cardinality	Description	Applicability
n/a					

This method shall support the request data structures specified in table 6.1.3.2.3.1-2 and the response data structures and response codes specified in table 6.1.3.2.3.1-3.

Table 6.1.3.2.3.1-2: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
MediaContext	M	1	Creates a new Individual Context resource

Table 6.1.3.2.3.1-3: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
MediaContext	M	1	201 Created	The creation of an Individual Media Context resource is confirmed and a representation of that resource is returned.
RedirectResponse	O	0..1	307 Temporary Redirect	Temporary redirection. (NOTE 2)
RedirectResponse	O	0..1	308 Permanent Redirect	Permanent redirection. (NOTE 2)
ProblemDetails	O	0..1	500 Server Internal Error	Indicates the creation of media context has failed due to application error. The "cause" attribute may be used to indicate one of the following application errors: - INSUFFICIENT_RESOURCES
NOTE 1: The manadatory HTTP error status code for the POST method listed in Table 5.2.7.1-1 of 3GPP TS 29.500 [4] also apply.				
NOTE 2: RedirectResponse may be inserted by an SCP, see clause 6.10.9.1 of 3GPP TS 29.500 [4].				

Table 6.1.3.2.3.1-4: Headers supported by the 201 response code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	Contains the URI of the newly created resource, according to the structure: {apiRoot}/nmf-mrm/<apiVersion>/contexts/{contextId}.

Table 6.1.3.2.3.1-5: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located on an alternative MF (service) instance. Or the same URI, if a request is redirected to the same target resource via a different SCP.
3gpp-Sbi-Target-Nf-Id	string	O	0..1	Identifier of the target MF instance ID towards which the request is redirected.

Table 6.1.3.2.3.1-6: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located on an alternative MF (service) instance. Or the same URI, if a request is redirected to the same target resource via a different SCP.
3gpp-Sbi-Target-Nf-Id	string	O	0..1	Identifier of the target MF instance ID towards which the request is redirected.

6.1.3.2.4   Resource Custom Operations

None in the release of this specification.

6.1.3.3   Resource: Individual Context

6.1.3.3.1   Description

The Individual Context resource represents an individual context created by the NF service consumers of Nmf_MRM service at a given MF. This resource is modelled as the Document resource archetype (see clause C.1 of 3GPP TS 29.501 [2]).

6.1.3.3.2   Resource Definition

Resource URI: **{apiRoot}/nmf_mrm/<apiVersion>/contexts/{contextId}**

The <apiVersion> shall be set as described in clause 6.3.1.

This resource shall support the resource URI variables defined in table 6.1.3.3.2-1.

Table 6.1.3.3.2-1: Resource URI variables for this resource

Name	Data type	Definition
apiRoot	string	See clause 6.1.1
contextId	string	Identifies an individual context to the Nmf_MRM service.

6.1.3.3.3   Resource Standard Methods

6.1.3.3.3.1   PATCH

This method shall support the URI query parameters specified in table 6.1.3.3.3.1-1.

Table 6.1.3.3.3.1-1: URI query parameters supported by the PATCH method on this resource

Name	Data type	P	Cardinality	Description	Applicability
n/a					

This method shall support the request data structures specified in table 6.1.3.3.3.1-2 and the response data structures and response codes specified in table 6.1.3.3.3.1-3.

Table 6.1.3.3.3.1-2: Data structures supported by the PATCH Request Body on this resource

Data type	P	Cardinality	Description
array(PatchItem)	M	1..N	Document describes the modification(s) to an Individual Context resource.

Table 6.1.3.3.3.1-3: Data structures supported by the PATCH Response Body on this resource

Data type	P	Cardinality	Response codes	Description
MediaContext	M	1..N	200 OK	Represents a successful update on the media context.
n/a			204 No Content	
RedirectResponse	O	0..1	307 Temporary Redirect	Temporary redirection. (NOTE 2)
RedirectResponse	O	0..1	308 Permanent Redirect	Permanent redirection. (NOTE 2)
ProblemDetails	O	0..1	403 Forbidden	Indicates the modification of media context has failed due to application error. The "cause" attribute may be used to indicate one of the following application errors: - MEDIA_ID_CONFLICT - MEDIA_CONNECTION_CHANGED
ProblemDetails	O	0..1	404 Not Found	Indicates the modification of media context has failed due to application error. The "cause" attribute may be used to indicate one of the following application errors: - CONTEXT_NOT_FOUND
Problem Details	O	0..1	500 Server Internal Error	Indicates the modification of media context has failed due to application error. The "cause" attribute may be used to indicate one of the following application errors: - INSUFFICIENT_RESOURCES
NOTE 1: The manadatory HTTP error status code for the PATCH method listed in Table 5.2.7.1-1 of 3GPP TS 29.500 [4] also apply.				
NOTE 2: RedirectResponse may be inserted by an SCP, see clause 6.10.9.1 of 3GPP TS 29.500 [4].				

Table 6.1.3.3.3.1-4: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located on an alternative MF (service) instance. Or the same URI, if a request is redirected to the same target resource via a different SCP.
3gpp-Sbi-Target-Nf-Id	string	O	0..1	Identifier of the target MF instance ID towards which the request is redirected.

Table 6.1.3.3.3.1-5: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located on an alternative MF (service) instance. Or the same URI, if a request is redirected to the same target resource via a different SCP.
3gpp-Sbi-Target-Nf-Id	string	O	0..1	Identifier of the target MF instance ID towards which the request is redirected.

6.1.3.3.3.2 DELETE

This method shall support the URI query parameters specified in table 6.1.3.3.3.2-1.

Table 6.1.3.3.3.2-1: URI query parameters supported by the DELETE method on this resource

Name	Data type	P	Cardinality	Description	Applicability
n/a					

This method shall support the request data structures specified in table 6.1.3.3.3.2-2 and the response data structures and response codes specified in table 6.1.3.3.3.2-3.

Table 6.1.3.3.3.2-2: Data structures supported by the DELETE Request Body on this resource

Data type	P	Cardinality	Description
n/a			

Table 6.1.3.3.3.2-3: Data structures supported by the DELETE Response Body on this resource

Data type	P	Cardinality	Response codes	Description
n/a			204 No content	
RedirectResponse	O	0..1	307 Temporary Redirect	Temporary redirection. (NOTE 2)
RedirectResponse	O	0..1	308 Permanent Redirect	Permanent redirection. (NOTE 2)
Problem Details	O	0..1	404 Not Found	Indicates the deletion of the context has failed due to application error. The "cause" attribute may be used to indicate one of the following application errors: - CONTEXT_NOT_FOUND
NOTE 1: The manadatory HTTP error status code for the DELETE method listed in Table 5.2.7.1-1 of 3GPP TS 29.500 [4] also apply.				
NOTE 2: RedirectResponse may be inserted by an SCP, see clause 6.10.9.1 of 3GPP TS 29.500 [4].				

Table 6.1.3.3.3.2-4: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located on an alternative MF (service) instance. Or the same URI, if a request is redirected to the same target resource via a different SCP.
3gpp-Sbi-Target-Nf-Id	string	O	0..1	Identifier of the target MF instance ID towards which the request is redirected.

Table 6.1.3.3.3.2-5: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located on an alternative MF (service) instance. Or the same URI, if a request is redirected to the same target resource via a different SCP.
3gpp-Sbi-Target-Nf-Id	string	O	0..1	Identifier of the target MF instance ID towards which the request is redirected.

6.1.3.3.4 Resource Custom Operations

None in the release of specification.

6.1.4 Custom Operations without associated resources

None in this release of specification.

6.1.5 Notifications

None in this release of specification.

6.1.6 Data Model

6.1.6.1 General

This clause specifies the application data model supported by the API.

Table 6.1.6.1-1 specifies the data types defined for the Nmf_MRM service based interface protocol.

Table 6.1.6.1-1: Nmf_MRM specific Data Types

Data type	Clause defined	Description	Applicability
MediaContext	6.1.6.2.2	Represents an individual context resource on MF.	
TerminationInfo	6.1.6.2.3	Represents the termination information.	
MediaInfo	6.1.6.2.4	Represents the media Information.	
DcMedia	6.1.6.2.5	Represents the DC media descriptor.	
ArMedia	6.1.6.2.6	Represents the AR media descriptor.	
Mdc2Protocol	6.1.6.3.3	Represents the type of the transport layer protocols for MDC2 interface.	

Table 6.1.6.1-2 specifies data types re-used by the Nmf_MRM service based interface protocol from other specifications, including a reference to their respective specifications and when needed, a short description of their use within the Nmf_MRM service based interface.

Table 6.1.6.1-2: Nmf_MRM re-used Data Types

Data type	Reference	Comments	Applicability
ProblemDetails	3GPP TS 29.571 [16]	Problem Details	
MediaId	3GPP TS 29.571 [16]	Uniquely identifies one media flow within an IMS session.	
MaxMessageSize	3GPP TS 29.571 [16]	Max SCTP user message size.	
MediaResourceType	3GPP TS 29.571 [16]	Media resource types.	
MediaProxy	3GPP TS 29.571 [16]	Media proxy configuration applicable to the media flow	
SecuritySetup	3GPP TS 29.571 [16]	Security setup of the DTLS association.	
DcEndpoint	3GPP TS 29.571 [16]	DC endpoint	
DcStream	3GPP TS 29.571 [16]	Data channel stream information.	
ReplaceHttpUrl	3GPP TS 29.571 [16]	Replacement HTTP URL allocated by the application layer.	
Uri	3GPP TS 29.571 [16]	Uri	
Endpoint	3GPP TS 29.571 [16]	Represents the IP endpoint.	Endpoint

6.1.6.2 Structured data types

6.1.6.2.1 Introduction

This clause defines the structures to be used in resource representations.

6.1.6.2.2   Type: MediaContext

Table 6.1.6.2.2-1: Definition of type MediaContext

Attribute name	Data type	P	Cardinality	Description	Applicability
contextId	string	C	0..1	Identifies a specific context. It is assigned by the MF when creating a new context, i.e. Nmf_MRM_Create operation.	
terminations	array(TerminationInfo)	M	1..N	Represents the media terminations	

6.1.6.2.3   Type: TerminationInfo

Table 6.1.6.2.3-1: Definition of type TerminationInfo

Attribute name	Data type	P	Cardinality	Description	Applicability
terminationId	string	C	0..1	Identifies a specific media termination. It shall be set to empty string (i.e., "") when service consumer requests the MF to add a new media termination in the Nmf_MRM_Create or Nmf_MRM_Update service operation. Otherwise, it shall contain the termination Id allocated by the MF.	
medias	array(MediaInfo)	M	1..N	Represent the list of media resources for one or multiple medias on the Mb interface.	

6.1.6.2.4   Type: MediaInfo

Table 6.1.6.2.4-1: Definition of type MediaInfo

Attribute name	Data type	P	Cardinality	Description	Applicability
mediaId	string	M	1	Identifies a media stream, e.g. data channel.	
mediaResourceType	MediaResourceType	M	1	Represents the media resource type, e.g. DC, AR.	
localMbEndpoint	Endpoint	C	0..1	Represents the local IP address and port number of the local endpoint of MF on the Mb interface. It will be allocated by MF. It shall be contained in the response when creating a new media stream, i.e. Nmf_MRM_Create operation or Nmf_MRM_Update operation with adding a new termination or adding a media in an existing termination. (NOTE 1, NOTE 2)	
remoteMbEndpoint	Endpoint	C	0..1	Represents the IP address and port number of the remote endpoint on the Mb interface, e.g. remote UE. It shall be contained in the request of creating a new media stream, i.e. Nmf_MRM_Create operation or Nmf_MRM_Update operation with adding a new termination or adding a media in an existing termination. It can be Null when originating a new media. (NOTE 2)	
dcMedia	DcMedia	C	0..1	Represents the data channel media descriptors. It shall be contained if the mediaResourceType is set to "DC".	
arMedia	ArMedia	C	0..1	Represents the AR media descriptors. It shall be contained if the mediaResourceType is set to "AR".	
mediaProcessingURL	Uri	C	0..1	The mediaProcessingURL indicates the address where MF receive service-related media instructions. It shall be contained in the response when creating a new media stream, i.e. Nmf_MRM_Create operation or Nmf_MRM_Update operation with adding a new termination or adding a media in an existing termination. (NOTE 1)	
NOTE 1: The IE cannot be changed once the media has been established. NOTE 2: The attribute "transport" inside Endpoint data type shall be set to value only "UDP".					

6.1.6.2.5   Type: DcMedia

Table 6.1.6.2.5-1: Definition of type DcMedia

Attribute name	Data type	P	Cardinality	Description	Applicability
mediaProxyConfig	MediaProxy	C	0..1	Represents the media proxy configuration. It shall be included if the mediaId reprensents bootstrap or P2A/A2P application data channels.	
replaceHttpUrl	map(ReplaceHttpUrl)	C	0..1	A map (list of key-value pairs where streamId is used as key of the map) of ReplacementHttpUrl. Represents URL for the specific IMS subscriber when requesting the application list (e.g. graphical user interface) via the MDC1 interface. It shall be included if the mediaId represents bootstrap data channel and streamId is 0 and 100.	
remoteMdc1Endpoint	Endpoint	C	0..1	Represents the remote MDC1 media endpoint information, i.e. the IP address and port number of DCSF. It shall be included if the mediaId represents a bootstrap data channel.	
remoteMdc2Endpoint	Endpoint	C	0..1	Represents the remote MDC2 media endpoint address, i.e. the IP address and port number of DC AS. It shall be included if the mediaId represents a P2A/A2P application data channel and the mediaProxyConfig is set to "HTTP".	
localMdc1Endpoint	Endpoint	C	0..1	Represents the local MF MDC1 media endpoint information. It will be allocated by MF and contained in the response when the mediaId represents a bootstrap data channel.	
localMdc2Endpoint	Endpoint	C	0..1	Represents the local MF MDC2 media endpoint information. It will be allocated by MF and contained in the response when the mediaId represents a P2A/A2P application data channel.	
mdc2Protocol	Mdc2Protocol	O	0..1	Represents the transport layer protocols for MDC2 interface. It may be included when mediaProxyConfig is set "HTTP" and remoteMdc2Endpoint is present.	
streams	map(DcStream)	M	1..N	A map (list of key-value pairs where streamId is used as key of the map) of DcStream. Represents the data channel mapping and configuration information when originating/terminating data channel media flows on the Mb interface.	
maxMessageSize	MaxMessageSize	O	0..1	Represents the maximum size of to be expected.	
localDcEndpoint	DcEndpoint	C	0..1	Represents the DC endpoint for the Data Channel. It will be allocated by MF. It shall be contained in the response when creating a new media stream, i.e. Nmf_MRM_Create operation or Nmf_MRM_Update operation with adding a new termination or adding a media in an existing termination. (NOTE)	

remoteDcEndpoint	DcEndpoint	C	0..1	Represents the DC Endpoint for the Data Channel on the Mb interface. It shall be contained in the request of creating a new media stream, i.e. Nmf_MRM_Create operation or Nmf_MRM_Update operation with adding a new termination or adding a media in an existing termination. It can be NULL when originating a data channel media. (NOTE)	
securitySetup	SecuritySetup	O	0..1	Represents the security set up of the DTLS association.	
NOTE: The IE cannot be changed once the media has been established.					

6.1.6.2.6 Type: ArMedia

Table 6.1.6.2.6-1: Definition of type ArMedia

Attribute name	Data type	P	Cardinality	Description	Applicability
mediaProcessingSpec	string	M	1	It specifies how the AR media stream should be processed. It indicates how the MF assists in the AR media rendering function.	

6.1.6.3 Simple data types and enumerations

6.1.6.3.1 Introduction

This clause defines simple data types and enumerations that can be referenced from data structures defined in the previous clauses.

6.1.6.3.2 Simple data types

The simple data types defined in table 6.1.6.3.2-1 shall be supported.

Table 6.1.6.3.2-1: Simple data types

Type Name	Type Definition	Description	Applicability

6.1.6.3.3 Enumeration: Mdc2Protocol

The enumeration Mdc2Protocol represents the type of the transport layer protocols for MDC2 interface. It shall comply with the provisions defined in table 6.1.6.3.3-1.

Table 6.1.6.3.3-1: Mdc2Protocol

Enumeration value	Description
"UDP/DTLS/SCTP"	UDP/DTLS/SCTP for MDC2 interface.
"TCP"	TCP for MDC2 interface.
"UDP"	UDP for MDC2 interface.
"SCTP"	SCTP for MDC2 interface.
"TCP/TLS"	TCP/TLS for MDC2 interface.
"SCTP/DTLS"	SCTP/DTLS for MDC2 interface.

6.1.7 Error Handling

6.1.7.1 General

For the Nmf_MRM API, HTTP error responses shall be supported as specified in clause 4.8 of 3GPP TS 29.501 [5]. Protocol errors and application errors specified in table 5.2.7.2-1 of 3GPP TS 29.500 [4] shall be supported for an HTTP method if the corresponding HTTP status codes are specified as mandatory for that HTTP method in table 5.2.7.1-1 of 3GPP TS 29.500 [4].

In addition, the requirements in the following clauses are applicable for the Nmf_MRM API.

6.1.7.2 Protocol Errors

No specific procedures for the Nmf_MRM service are specified.

6.1.7.3 Application Errors

The application errors defined for the Nmf_MRM service are listed in Table 6.1.7.3-1.

Table 6.1.7.3-1: Application errors

Application Error	HTTP status code	Description
CONTEXT_NOT_FOUND	404 Not Found	Indicates that the requested context is not found in the MF.
MEDIA_ID_CONFLICT	403 Forbidden	Indicates that mediaId which identifies the newly added media has existed within the specific termination.
MEDIA_CONNECTION_CHANGED	403 Forbidden	Indicates that the connection information which has been marked that cannot be changed once the media has established is changed in the request. including the remoteMbEndpoint, localMbEndpoint etc.

6.1.8 Feature negotiation

The optional features in table 6.1.8-1 are defined for the Nmf_MRM API. They shall be negotiated using the extensibility mechanism defined in clause 6.6 of 3GPP TS 29.500 [4].

Table 6.1.8-1: Supported Features

Feature number	Feature Name	Description

6.1.9 Security

As indicated in 3GPP TS 33.501 [8] and 3GPP TS 29.500 [4], the access to the Nmf_MRM API may be authorized by means of the OAuth2 protocol (see IETF RFC 6749 [9]), based on local configuration, using the "Client Credentials" authorization grant, where the NRF (see 3GPP TS 29.510 [10]) plays the role of the authorization server.

If OAuth2 is used, an NF Service Consumer, prior to consuming services offered by the Nmf_MRM API, shall obtain a "token" from the authorization server, by invoking the Access Token Request service, as described in 3GPP TS 29.510 [10], clause 5.4.2.2.

NOTE: When multiple NRFs are deployed in a network, the NRF used as authorization server is the same NRF that the NF Service Consumer used for discovering the Nmf_MRM service.

The Nmf_MRM API defines a single scope " nmf-mrm" for the entire service, and it does not define any additional scopes at resource or operation level.

6.1.10   HTTP redirection

An HTTP request may be redirected to a different MF service instance when using direct or indirect communications (see 3GPP TS 29.500 [4]).

An SCP that reselects a different MF producer instance will return the NF Instance ID of the new MF producer instance in the 3gpp-Sbi-Producer-Id header, as specified in clause 6.10.3.4 of 3GPP TS 29.500 [4].

If an MF redirects a service request to a different MF using an 307 Temporary Redirect or 308 Permanent Redirect status code, the identity of the new MF towards which the service request is redirected shall be indicated in the 3gpp-Sbi-Target-Nf-Id header of the 307 Temporary Redirect or 308 Permanent Redirect response as specified in clause 6.10.9.1 of 3GPP TS 29.500 [4].

Annex A (normative): OpenAPI specification

A.1 General

This Annex specifies the formal definition of the API(s) defined in the present specification. It consists of OpenAPI specifications in YAML format.

This Annex takes precedence when being discrepant to other parts of the specification with respect to the encoding of information elements and methods within the API(s).

NOTE 1: The semantics and procedures, as well as conditions, e.g. for the applicability and allowed combinations of attributes or values, not expressed in the OpenAPI definitions but defined in other parts of the specification also apply.

Informative copies of the OpenAPI specification files contained in this 3GPP Technical Specification are available on a Git-based repository that uses the GitLab software version control system (see clause 5.3.1 of 3GPP TS 29.501 [5] and clause 5B of 3GPP TR 21.900 [7]).

A.2 Nmf_MRM API

```
openapi: 3.0.0

info:
  title: 'MF Media Resource Management (MRM) Service'
  version: 1.0.0-alpha.2
  description: |
    MF Media Resource Management (MRM) Service.
    © 2024, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
    All rights reserved.

externalDocs:
  description: >
    3GPP TS 29.176 V18.1.0; IP Multimedia Subsystem (IMS); Media Function (MF) Services; Stage 3.
  url: https://www.3gpp.org/ftp/Specs/archive/29_series/29.176/

servers:
  - url: '{apiRoot}/nmf-mrm/v1'
    variables:
      apiRoot:
        default: https://example.com
        description: apiRoot as defined in clause 4.4 of 3GPP TS 29.501

security:
  - {}
  - oAuth2ClientCredentials:
    - nmf-mrm

paths:

  /contexts:
    post:
      summary: Create a new  media context.
      operationId: CreateMediaContext
      tags:
        - MediaContext(Collection)
      requestBody:
        required: true
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/MediaContext'
      responses:
        '201':
          description: Success
          content:
            application/json:
```

```
              schema:
                $ref: '#/components/schemas/MediaContext'
          headers:
            Location:
              description: >
                Contains the URI of the newly created resource, according to the structure:
                {apiRoot}/nmf-mrm/<version>/contexts/{contextId}
              required: true
              schema:
                type: string
        '307':
          description: Temporary Redirect
          content:
            application/json:
              schema:
                $ref: 'TS29571_CommonData.yaml#/components/schemas/RedirectResponse'
          headers:
            Location:
              description: The URI pointing to the resource located on the redirect target MF.
              required: true
              schema:
                type: string
        '308':
          description: Permanent Redirect
          content:
            application/json:
              schema:
                $ref: 'TS29571_CommonData.yaml#/components/schemas/RedirectResponse'
          headers:
            Location:
              description: The URI pointing to the resource located on the redirect target MF.
              required: true
              schema:
                type: string
        '400':
          $ref: 'TS29571_CommonData.yaml#/components/responses/400'
        '401':
          $ref: 'TS29571_CommonData.yaml#/components/responses/401'
        '403':
          $ref: 'TS29571_CommonData.yaml#/components/responses/403'
        '404':
          $ref: 'TS29571_CommonData.yaml#/components/responses/404'
        '411':
          $ref: 'TS29571_CommonData.yaml#/components/responses/411'
        '413':
          $ref: 'TS29571_CommonData.yaml#/components/responses/413'
        '415':
          $ref: 'TS29571_CommonData.yaml#/components/responses/415'
        '429':
          $ref: 'TS29571_CommonData.yaml#/components/responses/429'
        '500':
          $ref: 'TS29571_CommonData.yaml#/components/responses/500'
        '503':
          $ref: 'TS29571_CommonData.yaml#/components/responses/503'
        default:
          $ref: 'TS29571_CommonData.yaml#/components/responses/default'

  /contexts/{contextId}:

    patch:
      summary: Update Media Context
      operationId: UpdateMediaContext
      tags:
        - Media Context ID (Document)
      parameters:
        - name: contextId
          in: path
          required: true
          description: Unique ID of the Media Context to update.
          schema:
            type: string
      requestBody:
        content:
          application/json-patch+json:
            schema:
              type: array
              items:
                $ref: 'TS29571_CommonData.yaml#/components/schemas/PatchItem'
```

```
              minItems: 1
        required: true
      responses:
        '200':
          description: Expected response to a valid request.
          content:
            application/json:
              schema:
                $ref: '#/components/schemas/MediaContext'
        '204':
          description: Expected response with empty body
        '307':
          description: Temporary Redirect
          content:
            application/json:
              schema:
                $ref: 'TS29571_CommonData.yaml#/components/schemas/RedirectResponse'
          headers:
            Location:
              description: The URI pointing to the resource located on the redirect target MF.
              required: true
              schema:
                type: string
        '308':
          description: Permanent Redirect
          content:
            application/json:
              schema:
                $ref: 'TS29571_CommonData.yaml#/components/schemas/RedirectResponse'
          headers:
            Location:
              description: The URI pointing to the resource located on the redirect target MF.
              required: true
              schema:
                type: string
        '400':
          $ref: 'TS29571_CommonData.yaml#/components/responses/400'
        '403':
          $ref: 'TS29571_CommonData.yaml#/components/responses/403'
        '404':
          $ref: 'TS29571_CommonData.yaml#/components/responses/404'
        '409':
          $ref: 'TS29571_CommonData.yaml#/components/responses/409'
        '411':
          $ref: 'TS29571_CommonData.yaml#/components/responses/411'
        '412':
          $ref: 'TS29571_CommonData.yaml#/components/responses/412'
        '413':
          $ref: 'TS29571_CommonData.yaml#/components/responses/413'
        '415':
          $ref: 'TS29571_CommonData.yaml#/components/responses/415'
        '429':
          $ref: 'TS29571_CommonData.yaml#/components/responses/429'
        '500':
          $ref: 'TS29571_CommonData.yaml#/components/responses/500'
        '501':
          $ref: 'TS29571_CommonData.yaml#/components/responses/501'
        '503':
          $ref: 'TS29571_CommonData.yaml#/components/responses/503'
        default:
          $ref: 'TS29571_CommonData.yaml#/components/responses/default'

    delete:
      summary: Deletes a given Media Context
      operationId: DeleteMediaContext
      tags:
        - Media Context ID (Document)
      parameters:
        - name: contextId
          in: path
          required: true
          description: Unique ID of the Media Context to delete.
          schema:
            type: string
      responses:
        '204':
          description: Expected response to a successful deletion.
        '307':
```

```
                description: Temporary Redirect
                content:
                  application/json:
                    schema:
                      $ref: 'TS29571_CommonData.yaml#/components/schemas/RedirectResponse'
                headers:
                  Location:
                    description: The URI pointing to the resource located on the redirect target NRF.
                    required: true
                    schema:
                      type: string
              '308':
                description: Permanent Redirect
                content:
                  application/json:
                    schema:
                      $ref: 'TS29571_CommonData.yaml#/components/schemas/RedirectResponse'
                headers:
                  Location:
                    description: The URI pointing to the resource located on the redirect target NRF.
                    required: true
                    schema:
                      type: string
              '400':
                $ref: 'TS29571_CommonData.yaml#/components/responses/400'
              '401':
                $ref: 'TS29571_CommonData.yaml#/components/responses/401'
              '403':
                $ref: 'TS29571_CommonData.yaml#/components/responses/403'
              '404':
                $ref: 'TS29571_CommonData.yaml#/components/responses/404'
              '411':
                $ref: 'TS29571_CommonData.yaml#/components/responses/411'
              '429':
                $ref: 'TS29571_CommonData.yaml#/components/responses/429'
              '500':
                $ref: 'TS29571_CommonData.yaml#/components/responses/500'
              '501':
                $ref: 'TS29571_CommonData.yaml#/components/responses/501'
              '503':
                $ref: 'TS29571_CommonData.yaml#/components/responses/503'
              default:
                $ref: 'TS29571_CommonData.yaml#/components/responses/default'

components:

  securitySchemes:
    oAuth2ClientCredentials:
      type: oauth2
      flows:
        clientCredentials:
          tokenUrl: '{nrfApiRoot}/oauth2/token'
          scopes:
            nmf-mrm: Access to the Nmf_MRM API.

  schemas:

    MediaContext:
      description: Information of a Media Context in a MF.
      type: object
      required:
        - terminations
      properties:
        contextId:
          type: string
        terminations:
          type: array
          items:
            $ref: '#/components/schemas/TerminationInfo'
          minItems: 1

    TerminationInfo:
      description: Represents the termination information.
      type: object
      required:
        - terminationId
        - medias
      properties:
```

```
      terminationId:
        type: string
      medias:
        type: array
        items:
          $ref: '#/components/schemas/MediaInfo'
        minItems: 1

  MediaInfo:
    description: Represents the media information.
    type: object
    required:
      - mediaId
      - mediaResourceType
    properties:
      mediaId:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/MediaId'
      mediaResourceType:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/MediaResourceType'
      localMbEndpoint:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Endpoint'
      remoteMbEndpoint:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Endpoint'
      dcMedia:
        $ref: '#/components/schemas/DcMedia'
      arMedia:
        $ref: '#/components/schemas/ArMedia'
      mediaProcessingUri:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Uri'

  DcMedia:
    description: Represents the DC media descriptor.
    type: object
    required:
      - streams
    properties:
      mediaProxyConfig:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/MediaProxy'
      replaceHttpUrl:
        type: object
        description: >
          Contains a list of replacement HTTP URLs. The streamId attribute
          within the ReplaceHttpUrl data type is the key of the map.
        additionalProperties:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/ReplaceHttpUrl'
        minProperties: 1
      remoteMdc1Endpoint:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Endpoint'
      remoteMdc2Endpoint:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Endpoint'
      localMdc1Endpoint:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Endpoint'
      localMdc2Endpoint:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Endpoint'
      mdc2Protocol:
        $ref: '#/components/schemas/Mdc2Protocol'
      streams:
        type: object
        description: >
          Contains a data channel mapping and configuration information. The streamId
          attribute within the DcStream data type is the key of the map.
        additionalProperties:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/DcStream'
        minProperties: 1
      maxMessageSize:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/MaxMessageSize'
      localDcEndpoint:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/DcEndpoint'
      remoteDcEndpoint:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/DcEndpoint'
      securitySetup:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/SecuritySetup'

  ArMedia:
    description: Represents the AR media descriptor.
    type: object
    required:
      - mediaProcessingSpec
```

```
      properties:
        mediaProcessingSpec:
          type: string

  Mdc2Protocol:
    description: The type of the transport layer protocols for MDC2 interface.
    anyOf:
      - type: string
        enum:
          - UDP/DTLS/SCTP
          - TCP
          - UDP
          - SCTP
          - TCP/TLS
          - SCTP/DTLS
      - type: string
        description: >
          This string provides forward-compatibility with future extensions to the enumeration
          and is not used to encode content defined in the present version of this API.
```

Annex B (informative):
Change history

Change history							
Date	**Meeting**	**TDoc**	**CR**	**Rev**	**Cat**	**Subject/Comment**	**New version**
2023-04	CT4#115 e	C4-231552				Version 0.1.0	0.1.0
2023-05	CT4#116	C4-232178				Clause 4 Overview	0.2.0
2023-05	CT4#116	C4-232224				Clause 5.1 Introduction of DCMF services	0.2.0
2023-05	CT4#116	C4-232506				Service description and service operation introduction of MRM service	0.2.0
2023-05	CT4#116	C4-232607				MRM API definition	0.2.0
2023-05	CT4#116	C4-232637				MRM service operations	0.2.0
2023-08	CT4#117	C4-233707				Change DCMF to MF	0.3.0
2023-08	CT4#117	C4-233307				Update the data channel related data types	0.3.0
2023-08	CT4#117	C4-233306				Update MF service to support AR	0.3.0
2023-10	CT4#118	C4-234539				Update the scope	0.4.0
2023-10	CT4#118	C4-234540				Support of Redirection	0.4.0
2023-10	CT4#118	C4-234575				Clarification on the DC media	0.4.0
2023-10	CT4#118	C4-234543				Editorial Corrections	0.4.0
2023-10	CT4#118	C4-234544				Update the data model for AR remote cooperation	0.4.0
2023-10	CT4#118	C4-234341				Usage of the apiVersion placeholder	0.4.0
2023-11	CT4#119	C4-235576				Move the Endpoint to Common Data	0.5.0
2023-11	CT4#119	C4-235473				OpenAPI of Nmf_MRM Service	0.5.0
2023-12	CT#102	CP-233022				Presented for information and approval	1.0.0
2023-12	CT#102	CP-233022				Approved in TSC CT#102	18.0.0
2024-03	CT#103	CP-240043	0002		F	Support of media renegotiation	18.1.0
2024-03	CT#103	CP-240043	0001	1	B	EN resolution on AR media	18.1.0
2024-03	CT#103	CP-240043	0004	1	F	Change the map data type and correct the editorial errors	18.1.0
2024-03	CT#103	CP-240043	0007	1	F	Clarification of definitions, symbols and abbreviations	18.1.0
2024-2003	CT#103	CP-240043	0008	1	F	Correction IE of mdc2Protocol	18.1.0
2024-03	CT#103	CP-240043	0003	2	F	Add the error insufficient resource	18.1.0
2024-03	CT#103	CP-240043	0006	1	F	Update the Nmf_MRM_Update service operation	18.1.0
2024-03	CT#103	CP-240043	0005	3	F	Update the Nmf_MRM_Create service operation	18.1.0
2024-03	CT#103	CP-240056	0009		F	29.176 Rel-18 API version and External doc update	18.1.0

History

Document history		
V18.1.0	May 2024	Publication