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In the present document "**shall**", "**shall not**", "**should**", "**should not**", "**may**", "**need not**", "**will**", "**will not**", "**can**" and "**cannot**" are to be interpreted as described in clause 3.2 of the ETSI Drafting Rules (Verbal forms for the expression of provisions).

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Contents

Foreword

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

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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

should not indicates a recommendation not to do something

may indicates permission to do something

need not indicates permission not to do something

The construction "may not" is ambiguous and is not used in normative elements. The unambiguous constructions "might not" or "shall not" are used instead, depending upon the meaning intended.

can indicates that something is possible

cannot indicates that something is impossible

The constructions "can" and "cannot" are not substitutes for "may" and "need not".

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 specified the Application Programming Interface (API) for enabling the MSGin5G Service over MSGin5G-2/3/4 interfaces. The application layer architecture, functional requirements, procedures and information flows necessary for MSGin5G Service are contained in 3GPP TS 23.554 [2]. The requirements for MSGin5G are specified in 3GPP TS 22.262 [3].

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 23.554: "Application architecture for MSGin5G Service".

[3] 3GPP TS 22.262: "Message Service within the 5G System".

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

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

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

[7] 3GPP TS 23.222: "Functional architecture and information flows to support Common API Framework for 3GPP Northbound APIs; Stage 2".

[8] 3GPP TS 29.222: "Common API Framework for 3GPP Northbound APIs; Stage 3".

[9] 3GPP TS 29.501: "5G System; Principles and Guidelines for Services Definition; Stage 3".

[10] IETF RFC 7230: "Hypertext Transfer Protocol (HTTP/1.1): Message Syntax and Routing".

[11] IETF RFC 7231: "Hypertext Transfer Protocol (HTTP/1.1): Semantics and Content".

[12] IETF RFC 7232: "Hypertext Transfer Protocol (HTTP/1.1): Conditional Requests".

[13] IETF RFC 7233: "Hypertext Transfer Protocol (HTTP/1.1): Range Requests".

[14] IETF RFC 7234: "Hypertext Transfer Protocol (HTTP/1.1): Caching".

[15] IETF RFC 7235: "Hypertext Transfer Protocol (HTTP/1.1): Authentication".

[16] IETF RFC 7240: "Hypertext Transfer Protocol Version 2 (HTTP/2)".

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

[18] 3GPP TR 21.900: "Technical Specification Group working methods".

[19] 3GPP TR 33.862: "Study on security aspects of the Message Service for MIoT over the 5G System (MSGin5G)".

[20] 3GPP TS 33.501: "Security architecture and procedures for 5G system".

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

[22] 3GPP TS 33.122: "Security Aspects of Common API Framework for 3GPP Northbound APIs".

[23] 3GPP TS 29.522: "5G System; Network Exposure Function Northbound APIs; Stage 3".

[24] 3GPP TS 29.122: "T8 reference point for northbound APIs".

3 Definitions of terms, symbols and abbreviations

3.1 Terms

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

For the purposes of the present document, the following terms and its definitions given in 3GPP TS 23.554 [2] shall apply:

MSGin5G Service
MSGin5G message
MSGin5G UE
MSGin5G Group
MSGin5G Client
MSGin5G Server
Legacy 3GPP Message Gateway
Non-3GPP Message Gateway
Legacy 3GPP UE
Non-3GPP UE
Point-to-Point messaging
Point-to-Application messaging
Application-to-Point messaging
Group messaging
Broadcast messaging
Messaging Topic

3.2 Symbols

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

<symbol> <Explanation>

3.3 Abbreviations

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

AS Application Server
BC Broadcast
CAPIF Common API Framework

4 Overview

The MSGin5G Service is designed and optimized for massive IoT device communication including thing-to-thing communication and person-to-thing communication and provides messaging capability in 5GS with messaging communication models including Point-to-Point, Application-to-Point/Point-to-Application, Group and Broadcast messaging.

3GPP TS 23.554 [2] has specified the application layer architecture, architectural requirements, procedures, information flows and some APIs, in order to support the MSGin5G Service. Various features are defined to ensure the efficient use and deployment of MSGin5G Service, including configuration, registration, message delivery, message aggregation, segmentation and reassembly.

The present document specifies MSGin5G Services offered by MSGin5G Servers and MSGin5G Gateway, and APIs in detail, needed over MSGin5G-2/3/4 interfaces for interworking between MSGin5G Server and Legacy 3GPP UE, Non-3GPP UE or Application Server, with following functionalities need to be supported:

1. Server-side functionality with the sending and receiving of messages to/from Application Servers and/or other MSGin5G Service endpoints on other UEs, provided by MSGin5G Server.

2. Interconnecting two different messaging delivery mechanisms and assure the message integrity between different message delivery mechanisms, provided by Message Gateway.

And the definition of APIs specified in TS 23.554 [2] clause 9 is introduced in present document.

5 Services offered by the MSGin5G Servers

5.1 Introduction

The Table 5.1-1 lists the services provided by the MSGin5G Server and corresponding service operations. A service description clause for each API gives a general description of the related API.

Table 5.1-1 List of services provided by the MSGin5G Servers

Service Name	Service Operations	Operation Semantics	Example Consumer(s)
MSGS_ASRegistration	MSGS_ASRegistration_Request	Request/Response	AS
	MSGS_ASRegistration_Deregister		
MSGS_MSGDelivery	MSGS_MSGDelivery_ASODelivery	Request/ Response	AS, Legacy 3GPP Message Gateway, Non-3GPP Message Gateway
	MSGS_MSGDelivery_ASODeliveryReport		
	MSGS_MSGDelivery_UEODelivery		
	MSGS_MSGDelivery_UEODeliveryReport		

Table 5.1-2 summarizes the corresponding APIs defined in this specification.

Table 5.1-2: API Descriptions

Service Name	Clause	Description	OpenAPI Specification File	apiName	Annex
MSGS_ASRegistration	8.1	AS Registration Service	TS29538_MSGS_ASRegistration.yaml	msgs_asregistration	A.2
MSGS_MSGDelivery	8.2	Message Delivery Service	TS29538_MSGS_MSGDelivery.yaml	msgs_msgdelivery	A.3

5.2 MSGS_ASRegistration Service

5.2.1 Service Description

The MSGS_ASRegistration API, as defined in 3GPP TS 23.554 [2], allows an AS via Mm5s interface to register, and deregister at a given MSGin5G Server.

5.2.2 Service Operations

5.2.2.1 Introduction

The service operation defined for MSGS_ASRegistration API is shown in the Table 5.2.2.1-1.

Table 5.2.2.1-1: Operations of the MSGS_ASRegistration API

Service operation name	Description	Initiated by
MSGS_ASRegistration_Request	This service operation is used by the AS to register itself to MSGin5G Server.	AS
MSGS_ASRegistration_Deregister	This service operation is used by the AS to deregister itself from a MSGin5G Server.	AS

5.2.2.2 MSGS_ASRegistration_Request

5.2.2.2.1 General

This service operation is used by the AS to register itself to MSGin5G Server.

5.2.2.2.2 Application Server registering to MSGin5G Server using MSGS_ASRegistration_Request operation

To register itself at the MSGin5G Server, the AS shall send an HTTP POST message to the MSGin5G Server on the "AS Registrations" collection resource. The body of the HTTP POST message shall include the AS profile information, may include notification target URI for the registration, as specified in clause 8.1.2.2.3.1.

Upon receiving the HTTP POST message from the AS, the MSGin5G Server shall:

1. process the AS registration request information;
2. verify the identity of the AS and check if the AS is authorized to register itself at MSGin5G Server; and
3. if the AS is authorized to register to MSGin5G Server, then the MSGin5G Server shall:
   a. store the AS registration information and create a new resource with the AS registration information as specified in clause 8.1.2.1; and
   b. return the AS registration information, the resource URI of the AS registration information, in the response message.

5.2.2.3 MSGS_ASRegistration_Deregister

5.2.2.3.1 General

This service operation is used by the AS to deregister itself from a MSGin5G Server.

5.2.2.3.2 Application Server deregistering from MSGin5G Server using MSGS_ASRegistration_Deregister operation

To deregister itself from the MSGin5G Server, the AS shall send HTTP DELETE message to the MSGin5G Server on the "AS DeRegistration" collection resource, as specified in clause 8.1.2.3.3.2.

Upon receiving the HTTP DELETE request, the MSGin5G Server shall:

1. verify the identity of the AS and check if the AS is authorized to deregister the AS registration information;
2. if the AS is authorized to deregister the AS registration information, then the MSGin5G Server shall deregister the AS profile from the MSGin5G Server and delete the resource representing AS registration information; and
3. return the "200 OK" message to the AS, indicating the successful deregistration of the AS information.

5.3 MSGS_MSGDelivery Service

5.3.1 Service Description

The MSGS_MSGDelivery Service corresponding to Mm5s as defined in 3GPP TS 23.554 [2], is provided by the MSGin5G Server.

This service:

- allows AS invokes services provided by MSGin5G Server to send MSGin5G Messages to MSGin5G Server; and
- allows L3G/N3G invokes services provided by MSGin5G Server to send MSGin5G Messages to MSGin5G Server on behalf of Legacy 3GPP UE or Non-3GPP UE.

5.3.2 Service Operations

5.3.2.1 Introduction

The service operation defined for MSGS_MSGDelivery Service is shown in the Table 5.3.2.1-1.

Table 5.3.2.1-1: Operations of the MSGS_MSGDelivery Service

Service operation name	Description	Initiated by
MSGS_MSGDelivery_ASODelivery	This service operation is used by AS to deliver MSGin5G message to the MSGin5G Server. This service operation corresponds to clause 9.1.1.1.2 as defined in 3GPP TS 23.554 [2].	AS
MSGS_MSGDelivery_ASODeliveryReport	This service operation is used by AS to deliver the delivery status report to the MSGin5G Server. This service operation corresponds to clause 9.1.1.2.2 as defined in 3GPP TS 23.554 [2].	AS
MSGS_MSGDelivery_UEODelivery	This service operation is used by Legacy 3GPP Message Gateway or Non-3GPP Message Gateway (on behalf of Legacy 3GPP UE or Non-3GPP UE) to deliver MSGin5G message to the MSGin5G Server. This service operation corresponds to clause 9.1.1.3.2 as defined in 3GPP TS 23.554 [2].	Legacy 3GPP Message Gateway Non-3GPP Message Gateway
MSGS_MSGDelivery_UEODeliveryReport	This service operation is used by Legacy 3GPP Message Gateway or Non-3GPP Message Gateway (on behalf Legacy 3GPP UE or Non-3GPP UE) to deliver the delivery status report to the MSGin5G Server. This service operation corresponds to clause 9.2.1.4.2 as defined in 3GPP TS 23.554 [2].	Legacy 3GPP Message Gateway Non-3GPP Message Gateway

5.3.2.2 MSGS_MSGDelivery_ASODelivery

5.3.2.2.1 General

This service operation corresponding to clause 9.1.1.1.2 as defined in 3GPP TS 23.554 [2], is used by AS to deliver MSGin5G message to the MSGin5G Server.

5.3.2.2.2 AS Originating MSGin5G Message Delivery

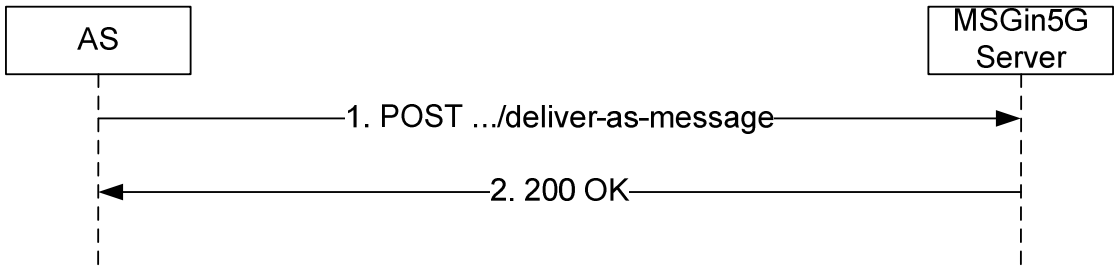

Figure 5.3.2.2.2-1: AS Originating MSGin5G Message Delivery

When the AS needs to send the message to the MSGin5G Server, the AS shall send the HTTP POST method as step 1 of the Figure 5.3.2.2.2-1.

The AS shall include ASMessageDelivery data structure in the payload body of the HTTP POST request.

The ASMessageDelivery data structure shall include:

- the Originating UE Service ID/AS Service ID within the "oriAddr" attribute;
- the Recipient Address within the "destAddr" attribute;
- the Message ID within the "msgId" attribute;
- the store and forward flag within the "stoAndFwInd" attribute; and

may include:

- the Application ID within the "appId" attribute;
- the security credentials within the "secCred" attribute;
- the indication whether the message delivery status report is required within the "delivStReqInd" attribute;
- the Payload within the "payload" attribute;
- the priority type within the "priority" attribute;
- the message segment flag within the "segInd" attribute;
- the message segment parameters within the "segParams" attribute, this attribute may include:
  - the segmentation set identifier within the "segId" attribute;
  - the total number of message segments within the "totalSegCount" attribute;
  - the message segment number within the "segNumb" attribute; and
  - the last segment flag within the "lastSegFlag" attribute;
- the store and forward parameters within the "stoAndFwParams" attribute, this attribute may include:
  - the message expiration time within the "exprTime" attribute;
- The latency within the "latency" attribute.

When the MSGin5G Server receives the HTTP POST request from the AS, the MSGin5G Server shall make an authorization based on the information received from the AS. If the authorization is successful, the MSGin5G Server shall respond to the AS with a 200 OK message.

If errors occur when processing the HTTP POST request, the MSGin5G Server shall apply error handling procedures as specified in clause 8.2.6.