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Contents

Foreword

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

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

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Introduction

1 Scope

The present document specifies the functional architecture, procedures, information flows and APIs for MSGin5G Service. MSGin5G Service provides messaging communication capability in 5GS especially for Massive Internet of Things (MIoT).

MSGin5G Service includes the following message communication models:

- Point-to-Point message;
- Application-to-Point message/ Point-to-Application message;
- Group message;
- Broadcast message.

The corresponding service requirements are defined in 3GPP TS 22.262 [2].

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 22.262: "Message Service within the 5G System".

[3] GSMA PRD RCC.07: "RCC.07 Rich Communication Suite 9.0 Advanced Communications Services and Client Specification".

[4] OMA OMA-ERELD-LightweightM2M-V1_1-20180612-C: "Enabler Release Definition for LightweightM2M".

[5] 3GPP TS 23.434: "Service Enabler Architecture Layer for Verticals".

[6] 3GPP TS 23.222: "Functional architecture and information flows to support Common API Framework for 3GPP Northbound APIs; Stage 2".

[7] 3GPP TS 23.502: "Procedures for the 5G System".

[8] 3GPP TS 23.682: "Architecture enhancements to facilitate communications with packet data networks and applications".

[9] 3GPP TS 29.122: "T8 reference point for northbound Application Programming Interfaces (APIs)".

[10] 3GPP TS 29.522: "5G System; Network Exposure Function Northbound APIs; Stage 3".

[11] 3GPP TS 23.401: "General Packet Radio Service (GPRS) enhancements for Evolved Universal Terrestrial Radio Access Network (E-UTRAN) access".

[12] 3GPP TS 23.501: "System Architecture for the 5G System (5GS); Stage 2".

[13] 3GPP TS 23.204: "Support of Short Message Service (SMS) over generic 3GPP Internet Protocol (IP) access; Stage 2".

[14] 3GPP TS 23.041: "Technical realization of Cell Broadcast Service (CBS)".

[15] 3GPP TS 23.040: "Technical realization of the Short Message Service (SMS)".

[16] 3GPP TS 33.501: "Security architecture and procedures for 5G System".

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] 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].

Application-to-Point messaging: An MSGin5G message delivery that is originated at an Application Server in the network and terminated at a UE.

Broadcast Area: an area consisting of one or more cells where the broadcast message is delivered.

Broadcast messaging: An MSGin5G message delivery that is delivered to UEs in a Broadcast Area.

Constrained UE: a UE (with or without MSGin5G client) which may not have capability to connect to the 3GPP network.

Group messaging: message delivery that is originated at a UE or an Application Server and is terminated at all members of the group (a group member can be of type UE, Legacy 3GPP UE or Non-3GPP UE).

Legacy 3GPP Message Gateway: the entity in MSGin5G Service to support interworking with Legacy 3GPP UEs.

Legacy 3GPP UE: the UE that supports legacy 3GPP message sending and receiving (e.g. SMS, NIDD, etc) in MSGin5G Service.

MSGin5G Client: the client that enables MSGin5G message sending and receiving.

Message Gateway: general terminology for Legacy 3GPP Message Gateway or Non-3GPP Message Gateway.

MSGin5G Gateway UE: a MSGin5G UE which constructs and sends MSGin5G message upon receiving request along with required application specific data from the application client on the Constrained UE (without MSGin5G client). The same MSGin5G UE can also deliver the received MSGin5G message towards the target application client on the Constrained UE (without MSGin5G client).

MSGin5G Group: the group of UEs which members may be MSGin5G UE, Legacy 3GPP UE and Non-3GPP UE.

MSGin5G message: the message defined in the present specification that is exchanged between the MSGin5G Service endpoints under the MSGin5G Service.

MSGin5G Relay UE: a MSGin5G UE which receives MSGin5G message from Constrained UE (with MSGin5G client) and forwards it to the MSGin5G server and vice-versa.

MSGin5G Server: A server in MSGin5G Service that receives and delivers MSGin5G messages among MSGin5G Service endpoints.

MSGin5G Service: an MNO message service using the 5G System that enables Point- to-Point, Application-to-Point, Point-to-Application, Group and Broadcast message delivery for thing-to-thing communication and person-to-thing communication.

Messaging Topic: an identifier for a topic to which a UE or an Application Server can subscribe to in order to receive messages that are characterized by a Message Topic.

MSGin5G UE: the UE that uses MSGin5G Client in MSGin5G Service.

Non-3GPP Message Gateway: the entity in MSGin5G Service to support interworking with Non-3GPP UEs.

Non-3GPP UE: the UE that supports non-3GPP message sending and receiving (e.g. RCS message as specified in GSMA PRD RCC.07 [3], OMA LWM2M message as specified in OMA OMA-ERELD-LightweightM2M [4]) in MSGin5G Service.

NOTE: The MSGin5G UE utilizes MSGin5G Client in MSGin5G Service. The Legacy 3GPP UE and Non-3GPP UE does not utilize MSGin5G Client in MSGin5G Service.

Non-MSGin5G UE: general terminology for Legacy 3GPP UE or Non-3GPP UE.

Point-to-Application messaging: An MSGin5G message delivery that is originated at a UE and terminated at an Application Server.

Point-to-Point messaging: An MSGin5G message delivery that originates at a UE and terminates at a UE, where at least one of the end points is an MSGin5G UE.

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].

5GS	5G System
CAPIF	Common API Framework for northbound APIs
NIDD	Non IP Data Delivery
SCEF	Service Capability Exposure Function
SEAL	Service Enabler Architecture Layer for Verticals
SMSC	Short Message Service Center
VAL	Vertical Application Layer
CoAP	Constrained Application Protocol
SCS	Service Capability Server

4 Architectural requirements

4.1 General

4.1.1 Description

This subclause specifies the general architecture requirements for MSGin5G Service.

4.1.2 Requirements

[AR-4.1.2-a] The MSGin5G Client shall support one or more applications which need to use the MSGin5G message exchanging capabilities.

[AR-4.1.2-b] The MSGin5G Server shall support one or more Applications Servers which support the MSGin5G message exchanging capabilities.

[AR-4.1.2-c] The MSGin5G messaging related capabilities (e.g. registration, Point-to-Point messaging, Group messaging, message delivery status, etc.) should be exposed as APIs to the Applications Server(s).

[AR-4.1.2-d] The application architecture shall enable the communication between the UEs in different PLMNs. The UEs support MSGin5G Service.

4.2 UE types

4.2.1 Description

This subclause specifies the requirements for UE types supported by MSGin5G Service.

Editor's note: It is FFS whether the MSGin5G Server and the Message Gateway require understanding of the UE type of the UEs served.

4.2.2 Requirements

[AR-4.2.2-a] The application architecture shall support the message exchanging between the following UE types:

1. MSGin5G UE:
   1) light weight constrained devices (e.g. sensors, actuators) and
   2) unconstrained devices with advanced capabilities (e.g. washing machine, micro-ovens)
2. Legacy 3GPP UE
3. Non-3GPP UE

[AR-4.2.2-b] The application architecture shall enable the unconstrained devices to act as a UE Message Gateway to constrained devices to communicate with MSGin5G Server.

4.3 Communication models

4.3.1 Description

This subclause specifies the requirements for MSGin5G communication models.

4.3.2 Requirements

[AR-4.3.2-a] The application architecture shall support the following message communication models:

1 Point-to-Point message;

2 Application-to-Point message/ Point-to-Application message;

3 Group message;

4 Broadcast message.

[AR-4.3.2-b] The application architecture shall support the interconnecting between MSGin5G and other different messaging delivery mechanisms, e.g. SMS specified in 3GPP TS23.040 [15], or RCS message as specified in GSMA PRD RCC.07 [3]).

5 Application layer architecture

5.1 General

The following aspects of MSGin5G Service are described in this clause:

- application architecture;
- functional entities;
- reference points; and
- capability exposure for enabling MSGin5G Service.

5.2 Application Architecture

Figure 5.2-1 shows the application architecture of the MSGin5G Service. The MSGin5G Service shall fulfil the service requirements which are enumerated in 3GPP TS 22.262 [2] and the architecture requirements enumerated in clause 4.

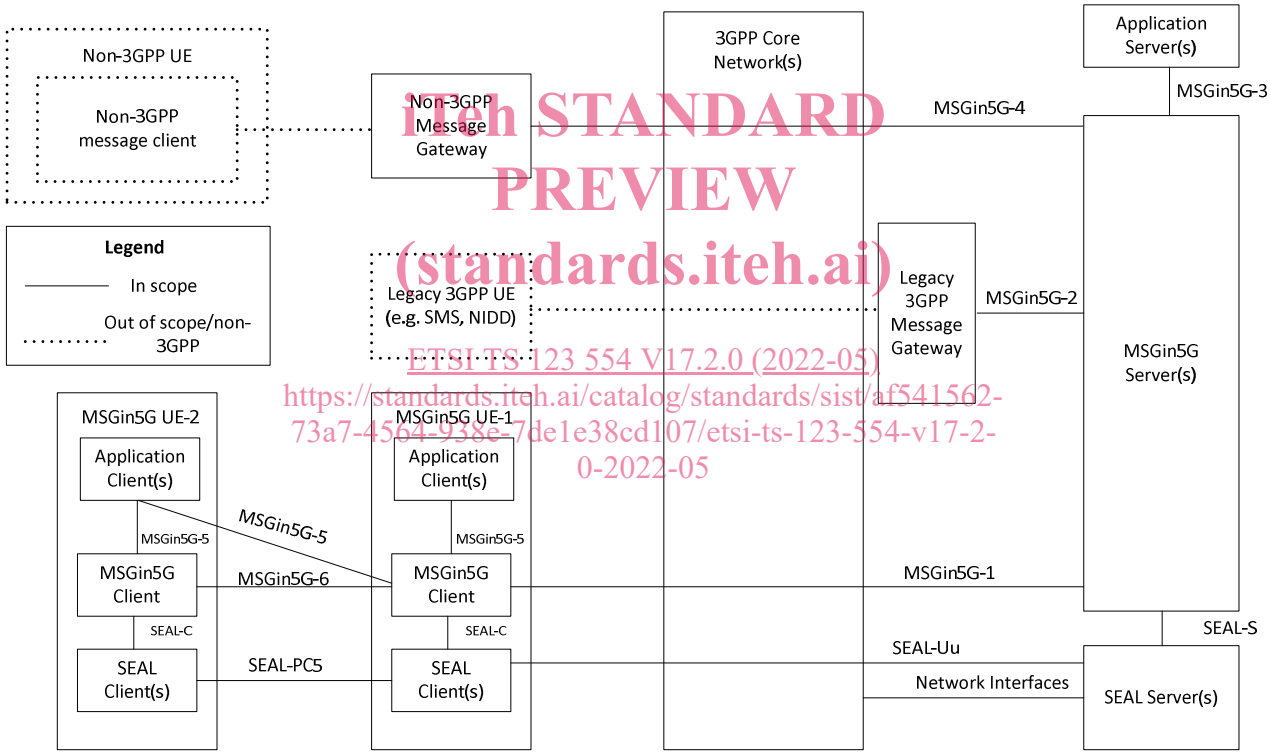

Figure 5.2-1: Application Architecture of the MSGin5G Service

The MSGin5G Client(s) interacts with SEAL Clients over the SEAL-C reference point specified for each SEAL service. The Legacy 3GPP Message Gateway and Non-3GPP Message Gateway may interact with SEAL clients over the SEAL-C reference point specified for each SEAL service. The MSGin5G Server(s) interacts with SEAL Servers over the SEAL-S reference point specified for each SEAL service. The interaction between a SEAL Client and the corresponding SEAL Server is supported by SEAL-UU reference point specified for each SEAL service as specified in 3GPP TS 23.434 [5].

NOTE2: For simplicity, the SEAL clients' interaction with Legacy 3GPP Message Gateway and Non-3GPP Message Gateway, and the SEAL-UU interface between Legacy 3GPP Message Gateway and Non-3GPP Message Gateway and SEAL servers are not shown in Figure 5.2-1.

The MSGin5G UE-1 may be constrained devices and unconstrained devices with advanced capabilities, and can communicate with MSGin5G Server over MSGin5G-1 reference point. The MSGin5G UE-2 is a constrained device

which does not have enough capability to communicate with MSGin5G Server. If allowed by configuration, the MSGin5G UE-1 may act as a UE Message Gateway to MSGin5G UE-2.

The Legacy 3GPP Message Gateway interacts with MSGin5G Server over MSGin5G-2 reference point on behalf of Legacy 3GPP UE (e.g., SMS, NIDD).

The Non-3GPP Message Gateway interacts with MSGin5G Server over MSGin5G-4 reference point on behalf of Non-3GPP UE.

NOTE 3: A SEAL Group Management Server and a SEAL Configuration Management Server (both specified in 3GPP TS 23.434 [5]) may be collocated in the MSGin5G Server. A SEAL Configuration Management Client specified in 3GPP TS 23.434 [5] may be collocated in the MSGin5G Client, Legacy 3GPP Message Gateway and Non-3GPP Message Gateway. The implementation of such deployment option is out of this specification.

NOTE 4: In certain deployment options, the MSGin5G UE-2 may not contain MSGin5G Client. In such scenario, the Application Client in MSGin5G UE-2 will interact with MSGin5G Client in MSGin5G UE-1 to send and receive messages.

NOTE 5: When both MSGin5G UE-1 and MSGin5G UE-2 support MSGin5G Client, MSGin5G Client in MSGin5G UE-1 acts as a MSGin5G Relay UE for the MSGin5G Client in MSGin5G UE-2 to receive MSGin5G Service. When MSGin5G UE-2 does not support an MSGin5G Client and only MSGin5G UE-1 supports an MSGin5G Client, MSGin5G Client in MSGin5G UE-1 acts as a MSGin5G Gateway UE for the Application Client in MSGin5G UE-2 to receive MSGin5G Service.

NOTE 6: Depending on the non-3GPP message service, the interaction between Non-3GPP message client and Non-3GPP Message Gateway may involve 3GPP Core Network.

NOTE 7: 3GPP Core Network may not be involved for the interaction between the Non-3GPP Message Gateway and the MSGin5G Server.

Editor's note: Specifying details of MSGin5G Client interaction towards Application Client is FFS.

5.3 Functional entities

5.3.1 General

The functional entities of the application architecture for the MSGin5G Service are described in this clause.

5.3.2 MSGin5G Server

5.3.2.1 General functionalities

An MSGin5G Server provides server-side functionality to assist MSGin5G Clients with the sending and receiving of messages via the MSGin5G Service to/from Application Servers and/or other MSGin5G Service endpoints on other UEs.

Functionalities of MSGin5G Server:

- To resolve message delivery mechanism for the MSGin5G Service endpoint based on the terminating MSGin5G Service ID to determine if the message is to be delivered to an MSGin5G UE, an Application Server or a Message Gateway for final delivery;
- To resolve the MSGin5G Group Service ID to determine the members of the Group specified in 3GPP TS 23.434[5];
- Interworking with non 3GPP messaging service through the Non-3GPP Message Gateway;
- Interworking with legacy 3GPP messaging service through the Legacy 3GPP Message Gateway;
- Exchanging MSGin5G messages with application servers, MSGin5G Clients, Legacy 3GPP Message Gateway and Non-3GPP Message Gateway;

- Supporting MSGin5G message segmentation according to service provider's policy;
- Supporting UE configuration procedures as specified in TS 23.434 [5] or communicating with the SEAL Configuration Management Server to provide MSGin5G configuration data on a UE to be ready for the MSGin5G Service; and
- Managing information related to the MSGin5G Service, such as MSGin5G Client availability, Legacy 3GPP Message Gateway and Non-3GPP Message Gateway.

Editor's note: What MSGin5G Client information related to the MSGin5G Service will be managed by the MSGin5G Server is FFS.

5.3.2.2 Target resolution

Upon receiving the MSGin5G message request to deliver the message to the recipient (which could be any of the MSGin5G UE, Legacy 3GPP UE, Non-3GPP UE or Application Server) on the terminating side, the MSGin5G Server checks the recipient's registration repository (created at the time of each MSGin5G UE/Application Server registration to MSGin5G Server, or the Message Gateway performs registration with the MSGin5G Server on behalf of the Non-MSGin5G UEs) for the Identities of MSGin5G service endpoints, i.e. UE Service ID/AS Service ID. The MSGin5G Server will attempt for delivery MSGin5G message request towards recipient based on the UE Service ID/AS Service ID. If the recipient is Non-MSGin5G UE, the Message Gateway that the Non-MSGin5G UE is registered with will receive the MSGin5G message request on behalf of the Non-MSGin5G UE, and then delivers the message to the Non-MSGin5G UE by using the Non-MSGin5G message delivery mechanism.

5.3.3 MSGin5G Client

An MSGin5G Client provides client-side functionality for UE Application Clients with the sending and receiving of messages via the MSGin5G Service to/from Application Servers and/or other MSGin5G Service endpoints; i.e. UEs.

Functionalities of MSGin5G Client including:

- may expose MSGin5G APIs to enable Application Clients to use an MSGin5G Service;
- supporting registration of an MSGin5G Client to an MSGin5G Server to use MSGin5G Service;
- supporting configuration of an MSGin5G Client required to use MSGin5G Service;
- construction of MSGin5G message when requested by a native application or Application Client;
- delivery of MSGin5G message payload to the targeted native application or Application Client; and
- exchanging MSGin5G messages via an MSGin5G Server to/from Application Servers and/or other MSGin5G Service endpoints; i.e. UEs. and
- acting as a relay for MSGin5G Client resides in other UE, which does not have enough capability to communicate with MSGin5G Server (i.e. a constrained device), to use MSGin5G Service.

NOTE 1: A native application on an MSGin5G UE is the application logic built within the MSGin5G Client.

NOTE 2: The MSGin5G Client resides in a constrained device is same as the MSGin5G Client resides in a unconstrained device. E.g. both of them use same transport/data formats and have the same capabilities.

5.3.4 Message Gateway

5.3.4.1 General Description of Message Gateway

A Message Gateway in MSGin5G application architecture provides functionality to deliver MSGin5G messages to Non-MSGin5G UEs.

A Message Gateway performs the role of interconnecting two different messaging delivery mechanisms and assures the message integrity between different message delivery mechanisms. A message delivery mechanism comprises the specific set of protocols, procedures and rules.