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| 3GPP TR 23.700-75 V0.3.0 (2024-03) | |
| Technical Report | |
| 3rd Generation Partnership Project;  Technical Specification Group Services and System Aspects;  Study on Multimedia Priority Service (MPS)  for IMS Messaging and SMS services  (Release 19) | |
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# Foreword

This Technical Report 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

**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 scope of this Technical Report is to study solutions addressing MPS priority for SMS and MPS priority for messaging services based on IMS within the 3GPP system. For IMS, the scope is limited to MPS priority by the 3GPP system when SIP is used to support the messaging service.

The study will investigate the following aspects:

- Solutions addressing how MPS for messaging services is requested and authorized using a UE with a subscription for MPS.

- Solutions addressing gaps for MPS priority treatment for messaging services using TS 23.228 [4] specified SIP MESSAGE and SIP sessions in EPC and 5GC.

- Solutions addressing gaps for MPS priority treatment in EPC and 5GC for messaging services using MO/MT SMS over IP, and MO/MT SMS over NAS. For SMS, only subscription-based priority treatment is in scope.

# 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 23.040: "Technical realization of the Short Message Service (SMS)".

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

[4] 3GPP TS 23.228: "IP Multimedia Subsystem (IMS); Stage 2".

[5] 3GPP TS 23.272: "Circuit Switched (CS) fallback in Evolved Packet System (EPS); Stage 2".

[6] 3GPP TS 23.401: "General Packet Radio Service (GPRS) enhancements for Evolved Universal Terrestrial Radio Access Network (E-UTRAN) access".

[7] 3GPP TS 23.501: "System architecture for the 5G System (5GS); Stage 2".

[8] 3GPP TS 23.502: "Procedures for the 5G System (5GS); Stage 2".

[9] 3GPP TS 23.540: "5G System: Technical realization of Service Based Short Message Service; Stage 2".

[10] 3GPP TS 23.632: “User data interworking, coexistence and migration, Stage 2”.

[11] 3GPP TS 29.122: “T8 reference point for Northbound APIs”.

[12] 3GPP TS 29.336: “Home Subscriber Server (HSS) diameter interfaces for interworking with packet data networks and applications”.

[13] 3GPP TS 29.503: “5G System; Unified Data Management Services; Stage 3”.

# 3 Definitions of terms and abbreviations

## 3.1 Terms

For the purposes of the present document, the terms given in 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 TR 21.905 [1].

**MPS for messaging service**: Any of the following network supported messaging technologies delivered with MPS priority: SMS over NAS, SMS over IP, and IMS Immediate Messaging and IMS Session-based Messaging as defined in TS 23.228 [4].

## 3.2 Abbreviations

For the purposes of the present document, the abbreviations given in 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 TR 21.905 [1].

DRMP Diameter Routing Message Priority

DTS Data Transport Service

MPS Multimedia Priority Service

# 4 Architectural Assumptions and Requirements

- Solutions shall build on the EPS, 5GS, and IMS architectures as in TS 23.204 [3], TS 23.228 [4], TS 23.401 [6], TS 23.501 [7], TS 23.502 [8], TS 23.040 [2], Annex C of TS 23.272 [5], TS 23.540 [9].

- Solutions for MPS priority for messaging via WLAN are based on existing MPS support for Non-3GPP WLAN.

- MPS priority treatment for SMS over NAS and SMS over IP requires an MPS subscription and MPS for messaging enabled.

# 5 Key Issues

## 5.1 Key Issue 1: MPS Priority support for Messaging over IMS

### 5.1.1 General description

This key issue investigates needed enhancements to support MPS priority for Messaging over IMS. A UE with MPS for messaging activated, will receive priority treatment in the presence of overload or congestion in IMS, EPS or 5GS for:

- Immediate Messaging as defined in clause 5.16.1 of TS 23.228 [4]; and

- Session-based Messaging as defined in clause 5.16.2 of TS 23.228 [4].

The KI should cover:

- Identification of any gap in signalling priority for procedures related with Messaging over IMS;

- Identification of any gaps in the subscription for MPS, including UE USIM aspects, and including aspects related with activation/deactivation of MPS for messaging;

- determine how the UEs that are authorized for MPS for messaging obtain priority treatment in functional entities involved in Messaging over IMS;

- How to support roaming.

NOTE: One or more of the functional entities might already be providing priority treatment for a UE with an MPS subscription configured in the UE USIM and/or in the HSS.

## 5.2 Key Issue 2: Priority support for SMS over IP based on MPS subscription

### 5.2.1 General description

This key issue investigates needed enhancements to support priority handling for SMS over IP based on the UE's MPS subscription. A UE with MPS for messaging will receive priority treatment in the presence of overload or congestion in EPS or 5GS for:

- mobile originated SMS over IP from the UE; and

- mobile terminated SMS over IP to the UE.

This KI should cover:

- Identification of any gap in signalling priority for SMS over IP procedures for UEs with MPS subscription;

- Identification of any gaps in the subscription for MPS, including UE USIM aspects, and including MPS for messaging activation/deactivation;

- Determine how the UEs that are authorized for MPS for messaging invoked obtain priority treatment in functional entities involved in SMS over IP service;

- How to support roaming.

NOTE: One or more of the functional entities might already be providing priority treatment for a UE with an MPS subscription configured in the UE USIM and/or in the UDM/HSS.

## 5.3 Key Issue 3: Priority support for SMS over NAS based on MPS subscription

### 5.3.1 General description

This key issue investigates needed enhancements to support priority handling for SMS over NAS based on the UE's MPS subscription. A UE with MPS for messaging will receive priority treatment in the presence of overload or congestion in EPS or 5GS for:

- mobile originated SMS over NAS from the UE; and

- mobile terminated SMS over NAS to the UE.

The KI should cover:

- Identification of any gap in signalling priority for SMS over NAS procedures for UEs with MPS subscription;

- Identification of any gaps in the subscription for MPS, including UE USIM aspects and MPS for messaging activation/deactivation;

- Determine how the UEs that are authorized for MPS for messaging obtain priority treatment in functional entities involved in SMS over NAS service;

- How to support roaming.

NOTE: One or more of the functional entities might already be providing priority treatment for a UE with an MPS subscription configured in the UE USIM and/or in the UDM/HSS.

# 6 Solutions

## 6.0 Mapping Solutions to Key Issues

Table 6.0-1: Mapping Solutions to Key Issues

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Key Issues | | | |
| Solutions | KI#1 | KI#2 | KI#3 |  |
| 1 |  | X |  |  |
| 2 |  |  | X |  |
| 3 | X |  |  |  |
| 4 | X | X | X |  |
|  |  |  |  |  |

## 6.1 Solution #1: SMS over IP (4G and 5G)

### 6.1.1 Introduction

This solution addresses Key Issue 2 on Priority support for SMS over IP based on MPS subscription, for mobile originated and mobile terminated Short Messages.



Figure 6.1.1-1: SMS over IP entities providing MPS priority for mobile originated short messages



Figure 6.1.1-2: SMS over IP entities providing MPS priority for mobile terminated short messages

Before a UE can send or receive an SMS over IP message, the UE must have previously registered with IMS. Subscribed QoS will be applied only between the UE and the PGW-u/UPF for the IMS signalling bearer or QoS Flow. Based on operator policy and/or regional/national regulations, an MPS subscribed UE can, but need not, be provisioned with MPS appropriate QoS for this default bearer/QoS Flow. 3GPP specifications allow the IMS signalling bearer/QoS Flow to be modified via PCC procedures to apply MPS appropriate QoS.

When the UE sends or is sent a Short Message and the MPS for messaging indication for the UE is activated according to information from the UDM/HSS, each entity will handle the Short Message with MPS priority.

The following are enabled by this solution when the MPS for messaging indicated for the UE is activated:

- Instant Messages in the IMS will be handled at the application level with priority (Resource-Priority information).

- Transport for signalling between the SMS GMSC and the IP SM-GW will be given priority.

For an MPS subscribed UE that does not have pre-configured MPS priority for the IMS signalling bearer or QoS Flow, availability of MPS for messaging will cause the QoS of the IMS signalling bearer or QoS Flow to be modified to apply MPS priority. Subsequently:

- Received messages will cause the idle UE to be paged with priority.

- Instant Messages from the P-CSCF to the UE will be treated with priority at the transport level.

### 6.1.2 Functional Description

Upon receiving a Short Message, the SMS-GMSC checks with the HSS/UDM/UDR whether the MPS for messaging indication is available is activated for the UE. If so, the SMS-GMSC sets the transport priority (e.g., DSCP and DRMP/Message Priority header) with a value appropriate for MPS and forwards the Short Message.

When the IP-SM-GW receives a Short Message with transport priority appropriate for MPS, the IP-SM-GW checks if the MPS for messaging for the UE is activated, and if it is, the IP-SM-GW adds the Resource-Priority information to the outgoing Instant Message with a value appropriate for MPS before forwarding the Instant Message to the S‑CSCF. Subsequent IMS functional entities (e.g., the S-CSCF, I-CSCF and P-CSCF) handle the Instant Message with priority based on the Resource-Priority information in the Instant Message.

NOTE 1: The MPS priority level QoS will trigger Paging Priority as specified in TS 23.401 [6] and TS 23.501 [7].

When receiving an Instant Message from the UE, the P-CSCF checks whether the MPS for messaging indication for the UE is activated, and if so, the P-CSCF sets the Resource-Priority information on the Instant Message to a value appropriate for MPS. Subsequent IMS functional entities (e.g., the S‑CSCF, I‑CSCF and IP-SM-GW) handle the Instant Message with priority based on the Resource-Priority information in the Instant Message. When the IP-SM-GW receives an Instant Message with the Resource-Priority information with a value appropriate for MPS, the IP-SM-GW sets the transport level priority on the outgoing Short Message to a value appropriate for MPS before sending the Short Message to the SMS-IWMSC.

The UE subscription data in the HSS/UDM/UDR contains an additional parameter indicating MPS treatment for messaging as part of the MPS subscription. This parameter is provided to related NFs involved in SMS over IP (e.g., IP-SM-GW, P-CSCF). The table below illustrates the possible settings of MPS related subscription data parameters.

Table 6.1.2-1: Example of MPS related subscription data information

|  |  |  |
| --- | --- | --- |
| Legacy MPS indication | MPS for messaging | Interpretation of the combination |
| set | set | MPS treatment is applicable including SMS over IP |
| set | clear | MPS treatment excluding SMS over IP. |
| clear | clear | No MPS treatment for the UE. |
| clear | set | Illegal combination. It shall be considered as error combination. |

NOTE 2: UE subscription data includes an MPS for messaging subscription; this is a pre-condition.

### 6.1.3 Procedures

#### 6.1.3.1 General

This clause describes the following procedures:

- Procedures for Short Message handling, MO, in clause 6.1.3.2;

- Procedures for Short Message handling, MT, in clause 6.1.3.3;

#### 6.1.3.2 Procedures for Short Message handling, MO

The procedure is based upon the procedure in TS 23.204 [3], clause 6.7 as illustrated in Figure 6.1.3.2‑1 below.



Figure 6.1.3.2-1 (TS 23.204 [3] Figure 6.7:) Successful IM origination to SMS procedure

The following steps refer to steps in clause 6.7 of TS 23.204 [3] as a baseline, and are enhanced for MPS treatment for SMS over IP.

2) The P-CSCF (not shown) checks whether it has received an indication that the MPS for messaging indication for the UE is activated and if it has, the P-CSCF sets the Resource-Priority information on the Instant Message to a value appropriate for MPS.

4) If the Resource-Priority information on the Instant Message is a value appropriate for MPS, the IP-SM-GW sets the transport priority (e.g., DSCP and DRMP/Message Priority header) of the outgoing Short Message(s) to a value appropriate for MPS.

#### 6.1.3.3 Procedures for Short Message handling, MT

The procedure is based upon the procedure in TS 23.204 [3], clause 6.14 as illustrated in Figure 6.1.3.3‑1 below.



Figure 6.1.3.3-1 (TS 23.204 [3] Figure 6.14): SMS over IP mobile terminated

The following steps refer to steps in clause 6.7 of TS 23.204 [3] as a baseline, are enhanced for MPS treatment for SMS over IP.

3a) The SMS GMSC also interrogates the HSS/UDM to retrieve the MPS for messaging indication for the UE.

3b) The HLR/HSS also returns the MPS for messaging indication for the UE.

3c) The IP-SM-GW also stores information about whether the MPS for messaging indication for the UE is activated. The IP‑SM‑GW returns the information about whether the MPS for messaging indication or the UE is activated. If the MPS for messaging indication for the UE is activated, the IP-SM-GW sets the transport priority (e.g., DSCP and DRMP/Message Priority header) on the message and handles the message with priority.

Editor’s note: IP-SM-GW storage in step 3c is FFS.

4) If the MPS for messaging indication for the UE is activated, the SMS-GMSC sets an appropriate priority (e.g., DSCP and DRMP/Message Priority header) for MPS and handles the Short Message with priority.

6) If the MPS for messaging indication for the UE is activated, the IP-SM-GW applies an MPS appropriate Resource-Priority information to the SIP message.

7) Based on the Resource Priority information from the S-CSCF, and if the P-CSCF supports Paging Policy Differentiation as per TS 23.401 [6] and per TS 23.501 [7], the P-CSCF (not shown in the Figure) sets a DSCP value to indicate to the EPS/5GS which paging policy for MPS should be applied. If the UE needs to be paged, the MME/AMF pages the UE with priority.

### 6.1.4 Impacts on services, entities, and interfaces

This solution will impact the following entities:

- SMS-GMSC: retrieves the MPS for messaging information from the HSS, sets transport priority on the Short Message.

- IP-SM-GW: adds Resource-Priority information to the Instant Message, adds transport priority to the Short Message.

- P-CSCF: sets RPH if MPS for messaging is available.

- S-CSCF: supplies the MPS for messaging information to the P-CSCF.

- AMF: pages the UE with priority.

## 6.2 Solution #2: MPS support for SMS over NAS

### 6.2.1 Introduction

NOTE: It is assumed that all NFs in a PLMN involved in the SMS over NAS delivery support MPS treatment when the feature is deployed.

This solution provides methods to support MPS treatment for SMS over NAS, for UEs with subscription data that indicates that SMS with MPS handling is included i.e., subscription data in the UDM are used for priority treatment related to SMS over NAS.

The MPS treatment for SMS over NAS is also supported by the EPS based on the same principle with the consideration that AMF/SMSF and UDM entities are replaced by MME and HSS. No SBI support exists in EPS.

### 6.2.2 Functional Description

The solution requires the UE to have an MPS subscription as specified in TS 23.501 [7].

- The UE subscription data in the UDM contains an additional parameter indicating MPS treatment for message as part of the MPS subscription. This parameter is provided to related NFs involved in SMS over NAS (i.e. AMF and SMSF). The table below illustrates the possible settings of MPS related subscription data parameters.

Table 6.2.2-1: Example of MPS related subscription data information

|  |  |  |
| --- | --- | --- |
| Legacy MPS indication | MPS for messaging | Interpretation of the combination |
| set | set | MPS treatment is applicable including SMS over NAS |
| set | clear | MPS treatment excluding SMS over NAS. |
| clear | clear | No MPS treatment for the UE. |
| clear | set | Illegal combination. It shall be considered as error combination. |

NOTE: UE subscription data includes an MPS for messaging subscription; this is a pre-condition.

- When establishing an access network connection by the UE, the Establishment Cause is set based on the existing MPS subscription and the Access Identity and allows the UE to obtain priority access. The network treats the connection establishment with priority in the same way as in existing procedures.

- When a CN entity, e.g. the AMF, communicates with other NFs related to the SMS over NAS service, the additional parameter is considered for message priority handling when NFs signal each other.

- the indication of MPS for message described above is assumed to apply for any form of messaging, including SMS over IMS and IMS messaging (session or MESSAGE based).

### 6.2.3 Procedures

#### 6.2.3.1 Registration procedure for SMS over NAS

The procedure is based on clause 4.13.3.1 of TS 23.502 [8] as illustrated in Figure 6.2.3.1-1.



Figure 6.2.3.1-1: Registration procedure supporting SMS over NAS

The following steps, referring to steps in clause 4.13.3.1 of TS 23.502 [8] as baseline, are enhanced for the MPS treatment for SMS over NAS.

1. The MPS-subscribed UE indicates the appropriate Establishment Cause based on MPS subscription and/or USIM Access Identity.

NOTE: It is nothing new logically since this step is referring to steps 1-3 in Figure 4.2.2.2.2-1 of TS 23.502 [8] which covers the Establishment Cause with MPS already. However, the MPS treatment is not specifically named in the SMS over NAS related procedure.

2. The AMF may receive the additional MPS for message indication from the UDM. The AMF stores the MPS for message indication in the UE context.

5. The AMF includes a Message Priority header to indicate priority information based on the MPS for message indication received in step 2 from UDM. The AMF may also provide the MPS for message indication as part of the Nsmsf\_SMService\_Active Request service operation.

7b-7c. The SMSF may also receive the additional MPS for message indication from the UDM as part of the SMS Management Subscription data. The SMSF stores the MPS for message indication in the UE context.

#### 6.2.3.2 MO SMS over NAS procedure

The procedure is based on clause 4.13.3.3 and 4.13.3.5 of TS 23.502 [8], as illustrated in Figure 6.2.3.2-1 below.



Figure 6.2.3.2-1: MO SMS over NAS

The following steps, referring to steps in clause 4.13.3.3 of TS 23.502 [8] as baseline, are enhanced for the MPS treatment for SMS over NAS.

1. The MPS-subscribed UE indicates the appropriate Establishment Cause.

NOTE 1: It is nothing new logically since this step referring to steps 1-3 in Figure 4.2.2.2.2-1 of TS 23.502 [8] which covers the Establishment Cause with MPS already. However, the MPS treatment is not specific named in the SMS over NAS related procedure.

3. The SMSF sets the DRMP based on the MPS for message indication

6a. The SMSF includes a Message Priority header to indicate priority information based on the MPS for message indication if such information is stored in UE context.

#### 6.2.3.2a MO SMS over NAS with SBI

The procedure is based on clause 5.2.2 of TS 23.540 [9], as illustrated in Figure 6.2.3.2a-1 below.



Figure 6.2.3.2a-1: MO SMS over NAS with SBI-based Interfaces

The following steps, referring to steps in clause 5.2.2 of TS 23.540 [9] as baseline, are enhanced for the MPS treatment for SMS over NAS.

1. Similar MPS handling as specified in step 1-2b in clause 6.2.3.2. The SMSF stores the MPS for messaging indication in the UE context if received from the AMF.

3. The SMSF sets the Message Priority Header if MPS for messaging indication information is stored in the UE context.

#### 6.2.3.3 MT SMS over NAS procedure

The procedure is based on clauses 4.13.3.6, 4.13.3.7 and 4.13.3.8 of TS 23.502 [8] as illustrated in Figure 6.2.3.3-1 below.



Figure 6.2.3.3-1: MT SMS over NAS

The following steps, referring to steps in clause 4.13.3.6 of TS 23.502 [8] as baseline, are enhanced for the MPS treatment for SMS over NAS.

2. The SMS-GMSC invokes UDM to get the serving node information for the UE. The UDM also indicates that MPS for messaging for the UE is activated based on the MPS for message indication in the subscription data.

3. The SMS-GMSC includes the MPS for message indication as part of the diameter message based on the received MPS for message indication from the UDM, if such information is available.

The SMSF stores the MPS for messaging indication in the UE context if received from the SMS-GMSC.

4. The SMSF includes a Message Priority header to indicate priority information based on the MPS for message indication if such information is stored in UE context.

The AMF includes Paging Priority if Paging needs to be triggered and the MPS for message indication is stored in UE context.

The AMF includes a Message Priority header to indicate priority information based on MPS for message indication if such information is stored in UE context, when communicating with the SMSF.

NOTE: The AMF and SMSF apply the same handling for Message Priority header in following steps when communicating with other NFs using the SBI interface.

#### 6.2.3.3a MT SMS over NAS with SBI

The procedure is based on clauses 5.1.2 of TS 23.540 [9], as illustrated in Figure 6.2.3.3a-1 below.



Figure 6.2.3.3a-1: MT SMS over NAS with SBI

The following steps, referring to steps in clause 5.1.2 of TS 23.540 [9] as baseline, are enhanced for the MPS treatment for SMS over NAS.

4. The UDM indicates that MPS for messaging for the UE is activated based on the MPS for message indication in the subscription data.

5. The SMS-GMSC includes a Message Priority header to indicate priority information based on the MPS for message indication if such information is available (e.g., based on information in step 4 above).

6. Similar MPS handling as specified in steps 4a-6b in clause 6.2.3.3.

NOTE: The SMSF and the AMF apply the same handling for the Message Priority header in subsequent steps when communicating with other NFs using the SBI interface.

#### 6.2.3.3b MT SMS over NAS with IP-SM-GW

The procedure is based on clause 5.1.4 of TS 23.540 [9], as illustrated in Figure 6.2.3.3b-1 below.



Figure 6.2.3.3b-1: MT SMS over NAS with IP-SM-GW

The following steps, referring to steps in clause 5.1.4 of TS 23.540 [9] as baseline, are enhanced for the MPS treatment for SMS over NAS.

4. The UDM indicates that MPS for messaging for the UE is activated based on the MPS for message indication in the subscription data. The IP-SM-GW stores the MPS for message indication in the UE context.

5. The IP-SM-GW includes a Message Priority header to indicate priority information based on the MPS for message indication if such information is stored in the UE context.

6. The UDM indicates that MPS for messaging based on MPS for message indication in the subscription data.

7. The SMS-GMSC includes a Message Priority header to indicate priority information based on the MPS for message indication if such information is available.

8. The IP-SM-GW includes a Message Priority header to indicate priority information based on the MPS for message indication if such information is stored in the UE context.

9. Similar MPS handling as specified in steps 4a-6b in clause 6.2.3.3.

NOTE: The SMSF and the IP-SM-GW apply the same handling for Message Priority header in subsequent steps when communicating with other NFs using the SBI interface.

#### 6.2.3.3c MT SMS over NAS with SMS Router

The procedure is based on clause 5.1.3 of TS 23.540 [9], as illustrated in Figure 6.2.3.3b-1 below.



Figure 6.2.3.3b-1: MT SMS over NAS with IP-SM-GW

The following steps, referring to steps in clause 5.1.3 of TS 23.540 [9] as baseline, are enhanced for the MPS treatment for SMS over NAS.

4. The UDM indicates that MPS for messaging for the UE is activated based on the MPS for message indication in the subscription data. The IP-SM-GW stores the MPS for message indication in the UE context.

5. The SMS Router includes a Message Priority header to indicate priority information based on the MPS for message indication if such information is stored in the UE context.

6. The UDM indicates that MPS for messaging for the UE is activated based on MPS for message indication in the subscription data.

7. The SMS-GMSC includes a Message Priority header to indicate priority information based on the MPS for message indication if such information is available.

8. The SMS Router includes a Message Priority header to indicate priority information based on the MPS for message indication if such information is stored in the UE context.

9. Similar MPS handling as specified in steps 4a-6b in clause 6.2.3.3.

NOTE: The SMSF and the SMS Router apply the same handling for Message Priority header in subsequent steps when communicating with other NFs using the SBI interface.

### 6.2.4 Impacts on services, entities, and interfaces

**UDM:**

- Supports the MPS subscription data with additional indication MPS for message.

**AMF:**

- Supports receiving a new indication for MPS for messaging in the subscription data.

- Supports SMS related Message Priority header handling based on the MPS for message indication.

- Paging priority treatment for MPS for messaging.

**SMSF:**

- Supports receiving a new indication for MPS for messaging in the subscription data from the UDM or from the AMF.

- Supports SMS related Message Priority header handling based on the MPS for message indication.

**IP-SM-GW/SMS Router:**

- Supports receiving a new indication for MPS for messaging in the subscription data from the UDM.

- Supports SMS related Message Priority header handling based on the MPS for message indication.

**SMS-GMSC/SMS-IWMSC:**

- Supports receiving a new indication for MPS for messaging from the UDM.

- Supports SMS related Message Priority header handling based on the MPS for message indication.

**UE:**

- Nothing new compared to existing procedures for MPS-subscribed UEs i.e. support appropriate for an MPS Establishment Cause.

## 6.3 Solution #3: IMS Messaging

### 6.3.1 Introduction

This solution addresses Key Issue 1 on Priority support for IMS messaging based on MPS subscription.

The following are enabled by this solution when the MPS for messaging indication is activated:

- Instant Messages in the IMS will be handled at the application level with priority (using Resource-Priority information).

- Messaging session invitations in the IMS will be handled at the application level with priority (using Resource-Priority information) and the resulting session given MPS level QoS.

For an MPS subscribed UE that does not have pre-configured MPS priority for the IMS signalling bearer or QoS Flow, setting/activation of MPS for messaging will cause the QoS of the IMS signalling bearer or QoS Flow to be modified to apply MPS priority. Subsequently:

- Received messages will cause the idle UE to be paged with priority.

- Instant Messages between the P-CSCF and the UE will be treated with priority at the transport level.

- Invites for messaging sessions from the UE to the P-CSCF will be treated with priority at the transport level.

NOTE: Based on operator policy and/or regional/national regulations, an MPS subscribed UE can be configured for MPS appropriate QoS for the IMS signalling bearer/QoS Flow. This subscribed QoS will be applied by the system only between the UE and the PGW/UPF and does not address other interfaces that also handle messages.

### 6.3.2 Functional Description

Entities that handle the IMS message or session find out whether MPS for messaging has been activated or deactivated by checking the UE's MPS for messaging indication in/from the HSS or the UDR as described in the Overall activation-deactivation for MPS for messaging solution, clause 6.4.

When receiving an Instant Message from the UE, the P-CSCF checks, locally, based on previously provided indication from the S-CSCF, or from the PCRF (or PCF in 5GC), whether the MPS for messaging indication for the UE is activated, and if so, the P-CSCF sets the Resource-Priority information on the Instant Message to a value appropriate for MPS. Subsequent IMS functional entities (e.g., the S‑CSCF and the I‑CSCF) handle the Instant Message with priority based on the Resource-Priority information in the Instant Message.

When receiving an invitation to an IMS messaging session from the UE, the P-CSCF checks whether the MPS for messaging indication for the UE is activated and if so, the P-CSCF sets the Resource-Priority information on the invitation to a value appropriate for MPS. Subsequent IMS functional entities (e.g., the S‑CSCF and the I‑CSCF) handle activity related to the session with priority based on the Resource-Priority information.

The UE subscription data in the HSS/UDR contains an additional parameter indicating MPS treatment for messaging as part of the MPS subscription. This parameter is provided to related NFs involved in IMS messaging (e.g., P-CSCF). The table below illustrates the possible settings of MPS related subscription data parameters.

Table 6.3.2-1: Example of MPS related subscription data information

|  |  |  |
| --- | --- | --- |
| Legacy MPS indication | MPS for messaging | Interpretation of the combination |
| set | set | MPS treatment is applicable including for Messaging for IMS. |
| set | clear | MPS treatment excluding messaging for IMS. |
| clear | clear | No MPS treatment for the UE. |
| clear | set | Illegal combination. It shall be considered as error combination. |

NOTE: UE subscription data includes an MPS for messaging subscription; this is a pre-condition.

### 6.3.3 Procedures

#### 6.3.3.1 General

This clause describes procedures for:

- Immediate messaging, in clause 6.3.3.2;

- Immediate messaging with multiple targets, in clause 6.3.3.3;

- Session based messaging handling, in clause 6.3.3.4;

#### 6.3.3.2 Procedures for immediate messaging

The procedure is based upon the procedure in TS 23.228 [4], clause 5.16.1.1.1 as illustrated in Figure 6.3.3.3‑1 below.



Figure 6.3.3.3-1 (TS 23.228 [4] Figure 5.47): Immediate Messaging procedure to registered Public User Identity

The following steps refer to steps in clause 5.16.1.1.1 of TS 23.228 [4] as a baseline, are enhanced for MPS treatment for IMS messaging.

3. P-CSCF#1 checks whether the MPS for messaging indication for the UE is activated, and if it is, P‑CSCF#1 sets the Resource-Priority information on the Instant Message to a value appropriate for MPS.

10. Based on the Resource Priority information from the S-CSCF#2, and if the P-CSCF#2 supports Paging Policy Differentiation as per TS 23.401 [6] and per TS 23.501 [7], the P-CSCF#2 sets a DSCP value to indicate to the EPS/5GS which paging policy for MPS should be applied. If the UE needs to be paged, the MME/AMF pages the UE with priority.

#### 6.3.3.3 Procedures for immediate messaging with multiple targets

The procedure for immediate messaging with multiple targets is the same as the procedure for immediate messaging except that a messaging application server duplicates the original MESSAGE and sends it out to multiple targets indicated in the MESSAGE.



Figure 6.3.3.4-1: Immediate Messaging with multiple targets procedure

In Figure 6.3.3.4-1, the following enhancements are made:

2. P-CSCF#1 checks whether the MPS for messaging indication for the UE is activated and if it is, P‑CSCF#1 sets the Resource-Priority information on the Instant Message to a value appropriate for MPS.

5.The AS shall copy the Resource-Priority information, if any, from the incoming immediate message into the newly created messages prior to sending.

In steps 7 and 9:

* the Messaging AS copies the Resource-Priority information from the MESSAGE in step 3 into the new MESSAGE; and
* based on the Resource Priority information from the S-CSCF#2, and if the P-CSCF#2 supports Paging Policy Differentiation as per TS 23.401 [6] or per TS 23.501 [7], the P-CSCF sets a DSCP value to indicate to the EPS/5GS which paging policy for MPS should be applied. If the UE needs to be paged, the MME/AMF pages the UE with priority.

#### 6.3.3.4 Procedures for session messaging

NOTE: The procedure is based upon the procedure in TS 23.228 [4], clauses 5.7a.2 and 5.16.2.2.1. The details added below for MPS are highlighted.

The following procedure shows the establishment of a message session between two registered UEs where the UEs are able to exchange messages end-to-end.



Figure 6.3.3.5-1 (TS 23.228 [4] Figure 5.19h): End-to-end session flow procedure without preconditions - no resource reservation required before session becomes active



Figure 6.3.3.5-2 (TS 23.228 [4] Figure 5.48a): Message session establishment

The following steps refer to steps in clause 5.16.1.1.1 of TS 23.228 [4] as a baseline, are enhanced for MPS treatment for IMS messaging.

1-30. For MPS for messaging, the following exception at step 3 in the referenced flow applies. P‑CSCF#1 checks whether the MPS for messaging indication for the UE is activated and if it is, P‑CSCF#1 sets the Resource-Priority information on the SIP INVITE Message to a value appropriate for MPS.

### 6.3.4 Impacts on services, entities, and interfaces

This solution will impact the following entities:

- P-CSCF: for MO, sets Resource-Priority information when it receives SIP MESSAGEs and SIP INVITEs for UEs that have MPS for messaging enabled.

## 6.4 Solution #4: Overall activation and deactivation of MPS for messaging

### 6.4.1 Introduction

This solution addresses Key Issues 1, 2 and 3 and assumes a common activation/deactivation of MPS for messaging that applies to both IMS messaging and SMS (over NAS and over IP).

### 6.4.2 Functional Description

Activation/deactivation controls whether the user is given MPS priority for messaging. The MPS for messaging activation/deactivation status for a UE in the HSS/UDM/UDR controls whether entities that handle IMS messages or sessions for messaging and entities that control SMS (over NAS or over IP) need to enforce MPS for messaging. This applies to a UE that already has an MPS subscription and the MPS for messaging indication activated.

MPS for messaging is activated or deactivated by an Application Function (e.g., a web server) by request to the SCEF via T8, as defined in TS 29.122 [11] or via the NEF in the 5GC via N33 as per TS 23.502 [8].

NOTE 1: How the Application Function is accessed to activate or deactivate MPS for messaging is out of scope of 3GPP.

NOTE 2: The Application Function does not need to know whether the UE is a 4G or a 5G user, thus it actually uses the same T8 or N33 API in both the EPC and 5GC case. A combo SCEF/NEF may be assumed as the Application Function should not have to know whether an user is an EPS or a 5GS user.

Activation/deactivation of MPS for messaging does not impact the ACB related configuration on the USIM.

Figure 6.4.2-1 shows how the activation/deactivation is set in the HSS in the EPC.



Figure 6.4.2-1: Activation/deactivation of priority for MPS messaging in the EPC case

MPS for messaging is activated or deactivated in the EPC by an Application Function by request to the SCEF via T8. The SCEF submits the activation/deactivation status to the HSS via S6t. If the UE has an MPS subscription in the HSS, the HSS authorizes the activation for UE for MPS for messaging and stores it in associated subscriber data to be provided to entities that need it. In Figure 6.4.2-1, the Consumer can be the MME, SMS-GMSC, IP-SM-GW, S-CSCF, etc.

Figure 6.4.2-2 shows how the activation/deactivation is set in the UDM/HSS in the 5GC,



Figure 6.4.2-2: Activation/deactivation of priority for MPS messaging in the 5GC case

MPS for messaging is activated or deactivated in the 5GC by an Application Function by request to the NEF via N33. The NEF submits the activation/deactivation status to the UDM via N52 per TS 29.503 [13] (for UDR via N37). If the UE has an MPS subscription in the UDM/UDR, the UDM authorizes the UE for MPS for messaging and makes the activation/deactivation status available to entities that need it. In Figure 6.4.2-2, the Consumer can be the AMF, IP-SM-GW, S-CSCF, etc.

How this activation/deactivation status is further distributed to the entities (i.e., identified as Consumer in Figure 6.4.2-1 and Figure 6.4.2-2) that need to provide priority for MPS for messaging is defined by other solutions.

UE subscription data that may be sent to EPC/5GC/IMS entities may contain an additional parameter indicating MPS treatment for message as part of the MPS subscription as shown in the table below. This parameter is provided to relevant NFs /entities (i.e., Consumers in Figures 6.4.2-1 and 6.4.2-2) involved in supporting SMS over NAS (i.e. AMF and SMSF) or over IP or IMS messaging. The table below illustrates the possibility of setting of MPS related subscription data parameters. Although illustrated for NAS, the same can apply to SMS over IP and IMS.

Table 6.4.2-1: Example of MPS related subscription data information

|  |  |  |
| --- | --- | --- |
| **Legacy MPS indication** | **MPS for message** | **Interpretation of the combination** |
| set | set | MPS treatment is applicable including SMS over NAS, |
| set | clear | MPS treatment excluding SMS over NAS. |
| clear | clear | No MPS treatment for the UE. |
| clear | set | Illegal combination. It shall be considered as error combination. |

The activation/deactivation status process described above consists only in the possibility for the end-user to control via an Application Function and NEF/SCEF of whether the MPS for message indication in the table above is sent with the set or clear value to EPC/5GC/IMS entities that may handle MPS.

### 6.4.3 Procedures

#### 6.4.3.1 General

The EPC procedures are given below, with differences for 5GC noted in parenthesis.



Figure 6.4.3-1, Activation

To activate MPS for messaging for a UE:

1. The Application Function sends an activation request to the SCEF (the NEF in the 5GC) via T8 (via N33 in the 5GC).

2. The SCEF (the NEF in the 5GC) forwards the request to the HSS via S6t, TS 29.336 [12] (via N52 and/or N37 in the 5GC).

3. The HSS (the UDM/UDR in the 5GC) authorizes the request for the UE by checking that the UE has a subscription for MPS in the HSS (the UDM/UDR in the 5GC). If there is an existing subscription for MPS for the UE, the HSS (the UDM/UDR in the 5GC) stores the information about whether MPS for messaging is available for the UE. If there is no existing subscription for MPS in the HSS (the UDM/UDR for the 5GC) for this UE, MPS for messaging is not available for the UE. For the 5GC case where the HSS is a separate entity from the UDM, the HSS obtains information about whether MPS for messaging is available for the UE from the UDM via NU1 via Nudm\_SDM as per TS 23.632 [10].

NOTE: - In the case of Nu1, the UDM needs to ensure atomicity of the NEF request. If the HSS rejects the request, the UDM needs to undo the local configuration it may have changed.

4. The HSS (the UDM/UDR in the 5GC) reports the result of the authorization decision back to the SCEF (the NEF in the 5GC) via S6t (via N52 in the 5GC).

5. The SCEF (the NEF in the 5GC) reports this back to the Application Function via T8 (via N33 in the 5GC).

6. The HSS (UDM/UDR in the 5GC) notifies/makes the indication available for retrieval to Consumers such as the MME (the AMF in 5GC), SMS-GMSC, IP-SM-GW, and S-CSCF. In addition, the SPR (UDR in the 5GC) notifies the PCRF (PCF in 5GC) to activate the IMS signaling priority, if IMS signaling priority is by subscription set to FALSE. The PCRF (PCF in 5GC) modifies the IMS signaling priority to a value appropriate for MPS for messaging.

Either the PCRF (or PCF in 5GC) performs procedure Activation/Deactivation based on HSS-method, as per clause 6.4.3.2, or Activation/Deactivation based on UDR-method, as per clause 6.4.3.3. The goal of these procedures is to inform the P-CSCF of the MPS for messaging indication which enables the P-CSCF to use Resource Priority information on SIP messages/sessions.

To deactivate MPS for messaging for a UE, the process is the same as the above except that the MPS for messaging is no longer available for the UE.

If the MPS subscription of a UE is removed from the HSS (the UDM/UDR in the 5GC) then MPS for messaging is no longer available for the UE. The HSS (the UDM/UDR in the 5GC) reports the status of the removal request to the SCEF (the NEF in the 5GC) with an appropriate message via S6t (via N52/N37 in the 5GC). The SCEF (the NEF in the 5GC) reports the result to the Application Function via T8 (via N33 in the 5GC).

If the IMS signaling priority was set to FALSE, the PCRF (PCF in 5GC) will restore the IMS signaling bearer to its original settings.

#### 6.4.3.2 Activation/Deactivation based on HSS-method – Alternative 1

Continuing the procedure from clause 6.4.3.1, upon activation, after the HSS (UDM/UDR in 5GC) has authorized a Service User for MPS for messaging, the HSS informs the S-CSCF via Cx/N72 with the MPS for messaging indication. Subsequently, the S-CSCF informs the P-CSCF (e.g., using a regEvent).

Upon deactivation, the HSS informs the S-CSCF about the removal of the MPS for messaging indication. The S-CSCF informs the P-CSCF (e.g., via a regEvent).

NOTE: The P-CSCF uses the MPS for messaging indication to set the Resource Priority information for SIP messages/sessions as described in other procedures.

#### 6.4.3.3 Activation/Deactivation based on UDR method – Alternative 2

Continuing the procedure from clause 6.4.3.1, upon activation, after the HSS (UDM/UDR in 5GC) has authorized a Service User for MPS for messaging, the SPR (UDR in 5GC) informs the PCRF (PCF in 5GC) with the MPS for messaging indication. Subsequently, the PCRF (PCF in 5GC) informs the P-CSCF via Rx/N5 about the MPS for messaging indication.

Upon deactivation, the HSS (UDR in 5GC) informs the PCRF (PCF in 5GC) about the removal of the MPS for messaging indication. The PCRF (PCF in 5GC) informs the P-CSCF.

NOTE: The P-CSCF uses the MPS for messaging indication to set the Resource Priority information for SIP messages/sessions as described in other procedures.

Editor’s note: The decision on the alternatives1 vs. 2 will be made during the conclusion phase.

### 6.4.4 Impacts on services, entities, and interfaces

This solution will impact following entities:

- NEF: relays activation and deactivation requests and responses between UDM and AF

- N52: Need to add MPS configuration data in Nudm\_ParameterProvision

- N37: Need to add MPS configuration data

- SCEF: relays activation and deactivation requests and responses between HSS and AF.

- S6t: Need to add MPS configuration data in the Configuration Information Request (CIR) sent from the NEF to the UDM

- Nu1: Similar to S6t impacts but over an SBA interface

- HSS: authorizes UEs for MPS for messaging, stores the activation/deactivation status, reports authorization results back to the SCEF, and makes the MPS for messaging status available to other functional entities.

- UDM: relays activation and deactivation requests to the HSS, authorizes UEs for MPS for messaging, stores the activation/deactivation status in UDR, reports authorization results back to the NEF, and makes the MPS for messaging status available to other functional entities.

- S6t: Need to add MPS configuration data in the Configuration Information Request (CIR) sent from the NEF to the UDM

- SPR: informs PCRF of change in the MPS for messaging indication

- UDR: informs PCF of change in the MPS for messaging indication

- PCRF: upgrades and restores the IMS signalling bearer based on a change in MPS for messaging indication in/from the SPR

- PCF: upgrades and restores the IMS signalling bearer based on a change in MPS for messaging indication in/from the UDR

Editor’s note: The upgrade and restoration of the IMS signalling bearer is FFS.

In the case of Activation/Deactivation based on HSS method – Alternative 1:

- S-CSCF: supplies information about whether MPS for messaging is available for the UE to the P-CSCF

- P-CSCF: receives information about the MPS for messaging status for the UE from the S-CSCF

In the case of Activation/Deactivation based on UDR method – Alternative 2:

- PCRF: informs the P-CSCF of the MPS for messaging indication via Rx/N5

- PCF: informs the P-CSCF of the MPS for messaging indication via Rx/N5

# 7 Evaluation

Editor's note: This clause provides an evaluation of the solutions.

# 8 Conclusions

Editor's note: This clause will capture conclusions from the study.

Annex A:  
Change history

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Change history | | | | | | | |
| Date | Meeting | TDoc | CR | Rev | Cat | Subject/Comment | New version |
| 2023-11 | SA2#160 | S2-2312997 | - | - | - | TR skeleton | 0.0.0 |
| 2023-11 | SA2#160 | - | - | - | - | S2-2313657: Scope and initial definitions and references.  S2-2313658: Architectural assumptions and requirements.  S2-2313659: MPS priority for messaging over IMS.  S2-2313660: MPS subscription-based priority support for SMS over NAS.  S2-2313661: MPS subscription-based priority support for SMS over IP. | 0.1.0 |
| 2024-01 | SA2#160-AH-e | - | - | - | - | S2-2401611: SMSoIP solution for Key Issue 2 on Priority for SMS over IP based on MPS subscription – general  S2-2401640: KI#3, New solution – MPS support for SMS over NAS | 0.2.0 |
| 2024-02 | SA2#161 |  |  |  |  | S2-2403433, KI#1 - Solution for MPS Priority support for Messaging over IMS  S2-2403436, KI#3, Solution#2 updates – address remains ENs  S2-2403728, KI#2 - Solution for Priority support for SMS over IP based on MPS subscription - procedures  S2-2403729, Overall solution – Invocation and revocation of MPS for messaging | 0.3.0 |