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Contents

Foreword

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

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Introduction

The response to emergency situations (e.g., floods, hurricanes, earthquakes, terrorist attacks) depends on the communication capabilities of public networks. In most cases, emergency responders use private radio systems to aid in the logistics of providing critically needed restoration services. However, certain government and emergency management officials and other authorised users have to rely on public network services when the communication capability of the serving network may be impaired, for example due to congestion or partial network infrastructure outages, perhaps due to a direct or indirect result of the emergency situation.

Multimedia Priority Service, supported by the 3GPP system set of services and features, is one element creating the ability to deliver calls or complete sessions of a high priority nature from mobile to mobile networks, mobile to fixed networks, and fixed to mobile networks.

1 Scope

The present document specifies the service requirements for Multimedia Priority Service (MPS).

The scope of this document is to specify those requirements of MPS necessary to provide an end-to-end service and to interwork with external networks where needed. Service interactions with external networks are considered within the scope of this document although these interactions may be specified in other standards.

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 TS 21.905: "Vocabulary for 3GPP Specifications".

[2]   3GPP TR 22.952: "Priority Service Guide".

[3]   3GPP TS 22.067: "enhanced Multi-Level Precedence and Pre-emption service (eMLPP); Stage 1".

[4]   3GPP TS 23.067: "enhanced Multi-Level Precedence and Pre-emption service (eMLPP); Stage 2".

[5]   3GPP TS 24.067: "enhanced Multi-Level Precedence and Pre-emption service (eMLPP); Stage 3".

[6]   3GPP TS 22.011: "Service accessibility".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions 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 session: A session for which priority treatment is applied for allocating and maintaining radio and network resources.

MPS-subscribed UE: A UE having MPS subscription.

Priority Treatment: Refers to mechanisms and features that increase the success rate for MPS session invocation, establishment and maintenance until release.

Service User: An individual authorized to use MPS and who has been granted a user priority level assignment by a regional/national authority (i.e., an agency authorised to issue priority assignments), and has a subscription to a mobile network operator that supports the MPS feature.

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].

> **MPS** Multimedia Priority Service

4 General description

MPS provides priority treatment to increase the probability of an authorized Service User's Voice, Video, and Data communication session being successful. Some form of priority treatment is applied to the MPS invocation and session establishment, and continues to be applied until the MPS session is released. The priority treatment may be applied before the invocation if a greater probability of success in receiving, recognizing, and processing the invocation is needed.

MPS allows qualified and authorized users to obtain priority access to the next available radio channel on a priority basis before other PLMN users, during situations when PLMN congestion is blocking session establishment attempts. In addition, MPS supports priority sessions on an "end-to-end" priority basis.

MPS is intended to be utilised for Voice, Video, and Data bearer services in the Packet-switched (PS) domain and the IP Multimedia Subsystem (IMS). It also involves priority transitioning of MPS service (e.g., Voice) to the CS domain when the network does not support the requested service in the PS domain. MPS Voice, Video and Data sessions are based on providing priority treatment to the corresponding commercial services offered to the public.

MPS includes network functions that fall into the following broad categories:

Service Invocation: The process to recognize and identify a request for an MPS session. A MPS Service Provider network recognizes an MPS invocation based on the presence of an MPS-unique identifier entered by the originating Service User in the service request received by the network from the UE, or based on the subscription profile of the originating UE, or as a regional/operator option the subscription profile of the terminating UE.

> NOTE: The option related to "subscription profile of the terminating UE" may not involve end-to-end priority because this option is based on providing priority only in the terminating network based on the terminating UE subscription profile.

Authorization: The process to verify that a Service User is authorized for MPS. This includes capabilities to verify authorization to receive priority treatment in the radio access network and to access the MPS application service (MPS Voice, Video, and Data).

End-to-End Priority Treatment: The process of providing priority treatment in all parts of the path, from one endpoint to the other endpoint(s). End-to-end priority treatment includes priority treatment by all MPS capable networks involved in the MPS session path, the origination network and the termination network as well as any transit networks in between.

Invocation-to-Release Priority Treatment: The process of providing priority treatment to all phases of a session, from invocation until release, including all steps in between.

The combination of End-to-End Priority Treatment and Invocation-to-Release Priority Treatment includes both pre- and post-authorization treatment and includes the following aspects:

1) Priority processing of the Service User's MPS invocation,

2) Admission control and allocation of network resources (including bearer resources) in origination, termination, and transit networks, including handovers,

3) Transport of signaling and media packets,

4) Priority processing within EPS and CN, and

5) Processing of the Service Users release of an MPS service session.

Network Interconnection and Protocol Interworking: A Service User's MPS invocation and session establishment will involve transport and processing, and the end-to-end signaling and media path may traverse multiple MPS Service Provider networks. These end-to-end cases include, but are not limited to:

1) LTE-to-LTE for voice, video, and data services, including signaling for call/session establishment and media;

2) LTE interworking with the CS domain, including a) calls originated in the CS domain and terminated in LTE, and b) calls from LTE to the CS domain;

3) CS Fallback from LTE, for one or both ends of call, with maintenance of existing PS domain MPS services, either in LTE or in a legacy system, e.g., the GPRS Core; and

4) LTE access to MPS data and video services not under IMS control.

5 High level requirements

5.1 General

Upon invocation of MPS, the system shall provide preferential treatment for access and core network resources associated with the session (i.e., signalling and media bearer related resources within a domain and across domains). A Service User is assigned a priority level by a regional/national authority i.e., agency authorised to issue priority levels. Upon MPS invocation the calling Service User's priority level is used to identify the priority to be used for the session being established.

Pre-emption of active sessions shall be subject to regional/national regulatory requirements.

Subject to regional/national regulatory policy, a PLMN should have the capability to retain public access as a fundamental function. Therefore, MPS traffic volumes should be limited (e.g. not to exceed a regional/national specified percentage of any concentrated network resource, such as eNodeB capacity), so as not to compromise this function.

5.2 Priority session treatment in originating network

When an MPS session is originated by a Service User, the session shall receive priority treatment (priority access to signalling and media bearer resources for voice, video, and data) in the originating PLMN based on the originating Service User priority information (i.e., priority indication and priority level).

When an MPS session is requested by a Service User and the originating network supporting session establishment cannot assign the necessary resources to the MPS session, the MPS session request shall be:

- Queued,

- Processed for the next available resource in accordance with the calling Service User's priority level and session initiation time.

The network shall support the capability to inform the calling Service User about the status of the MPS session (e.g., tones or signalling messages can be used to indicate that the session request has been queued).

If the queued MPS session times out, then normal session processing applies.

5.3 Priority session progression

For an MPS session, a Service User shall receive priority session treatment/progression through the PLMN(s). In case the MPS session traverses or terminates in other networks (e.g., the PSTN), the network providing priority session treatment/progression shall support the capability to indicate to the other network that this is an MPS session.

Note: If there is no agreement on priority handling between networks, the priority does not carry across network boundaries.

5.4   Priority session treatment in terminating network

When a terminating network receives an incoming MPS session establishment attempt, the MPS session shall receive priority treatment (priority access to signaling and media bearer resources for voice, video, and data) in the terminating PLMN, based on the originating Service User priority information.

As an operator option, the terminating network may invoke priority treatment for an incoming session from a non-MPS subscriber to a MPS subscriber (see clause 4).

When the terminating network supporting session establishment cannot assign the necessary resources to the MPS session, the MPS session request shall be:

- Queued,

- Processed for the next available resource in accordance with the Service User's priority level and session arrival time.

The network shall support the capability to inform the calling Service User about the status of the MPS session (e.g., tones or signalling messages can be used to indicate that the session request has been queued).

If the queued MPS session times out, then normal session processing applies.

5.4a   Priority Data Bearer Service

The Priority Data Bearer Service provides LTE access with MPS priority for data and video services not under IMS control.

When a Service User invokes Priority Data Bearer Service for transport of any data packets to and from that Service User, the network should give priority in admission/upgrade of the Priority Data Bearer(s) and in packet data scheduling in the event of congestion (for new sessions and upgrade to existing sessions), subject to regional/national regulatory policy. Specifically:

- A Priority Data Bearer service session shall be given priority for admission/upgrade over non-Priority Data Bearer sessions during times of congestion;

- Data packets belonging to a Priority Data Bearer service shall not be dropped before data packets belonging to a non-Priority Data Bearer service session, when the network is experiencing congestion, subject to the limitation imposed by public access. Priority Data Bearer session QoS, as required for the type of service invoked (e.g., packet delay), should be maintained throughout the activity of the data session.

5.5   Priority levels

The Service User shall be assigned one of "n" user priority levels. The priority levels are defined with 1 being the highest priority level and "n" being the lowest priority level.

The 3GPP network shall be able to support at least 5 user priority levels.

Assignment of priority levels is a matter of regional/national and operator policy.

In case of interconnecting networks that have different priority levels, mappings between priority levels should be established.

5.6   Invocation on demand

MPS priority shall be invoked only when requested by the Service User. However, certain priority treatments are provided prior to invocation as specified in Section 5.13.

MPS is applied when idle resources required for an origination session request are not available.

If idle resources are available when MPS is requested, the request shall be allowed to proceed as normal, but marked as an MPS request.

An indication of an MPS session should be propagated towards the terminating network regardless of the availability of resources in the originating network.

5.7 Multimedia priority service code/identifier

MPS shall be requested by including an MPS code/identifier in the session origination request, or optionally, by using an MPS input string (e.g., an MPS public user identity).

5.8 Roaming

MPS shall be supported when the Service User is roaming and the visited network and home network support MPS, and roaming agreements are in place for MPS.

5.9 Handover

MPS shall be supported during and after the handover (i.e., sessions shall continue to get priority treatment in the network during and after the handover). Resource allocation for the session during handover shall receive priority treatment (priority access to signalling and media bearer resources for voice, video, and data) in the target cell based on the Service User priority information (i.e., priority indication and priority level).

For handover of an MPS voice call to CS, only the active, or if all calls are on hold, only the most recently active voice call shall be transferred and receive the priority treatment in CS. Any remaining non-MPS voice sessions in PS may be released. Any remaining MPS sessions, e.g., MPS data, in PS shall not be released.

5.10 Interworking with CS domain

5.10.1 Mobile origination in the CS domain -> MPS mobile termination

For a Priority Service voice call, as described in [2] and as specified in [3, 4, 5], originated by a Service User in the CS Domain, MPS shall support priority Mobile Termination of the session in the IMS. The priority information received from the CS domain shall be mapped and used in the IMS accordingly.

5.10.2 MPS mobile origination -> mobile termination to the CS domain

For an MPS voice session originated by a Service User in the IMS, MPS shall support priority delivery of the voice session to the serving CS Domain. The calling Service User priority level shall be sent to the CS Domain.

5.10.3 CS Fallback from LTE

Circuit Switched (CS) fallback from LTE needs to be given priority in the LTE system to support MPS voice in cells where voice is not supported in the PS domain. Priority treatment applies to both mobile originated calls and mobile terminated calls.

When an MPS Service User in LTE originates a voice call intended to be supported in the CS domain, and when configured by the operator, the LTE system shall provide priority treatment in the signalling and resource allocations needed to support priority CS fallback.

When a terminating LTE network receives indication of an incoming call to the CS domain, the LTE system shall provide priority treatment in the signalling and resource allocations needed to support priority CS fallback.

5.11 Network Management Functions

Based on regional/national requirements and network operator policy, an MPS session shall be exempted from network management controls up to the point where further exemption would cause network instability. Congestion controls, overload controls, load balancing, and load re-balancing shall not adversely impact MPS.

5.12   Policy Control

The 3GPP network shall be able to make and enforce policy decisions regarding relative treatment of MPS application services (Voice, Video and Data) for admission control subject to regional/national regulatory requirements and operator policy.

The 3GPP network shall be able to make and enforce policy decisions regarding relative treatment of MPS application services traffic depending on the media type subject to regional/national regulatory requirements and operator policy (e.g., based on operator policy or regulation, Voice should have higher priority than Video or Data).

5.13   Priority before service invocation

5.13.1   Overview of priority before service invocation

Providing priority treatment to MPS-subscribed UEs during attachment for radio access and network connectivity before the MPS application service session invocation requests improves the probability of an MPS session request being successful. This involves providing priority treatment for the signalling during the UE attachment for radio access and network connectivity based on a subscription profile. Prior to accessing subscription related information in the network, subscription related information stored in the UE is used, e.g., membership in the special access class required to be reserved for MPS use as per 3GPP TS 22.011 [6]. Without such priority treatment, a Service User's UE might fail to gain radio access network and CN connectivity which in turn means that there is no access to the MPS application services (Voice, Video, and Data). Priority treatment before MPS session request increases the probability of successful MPS session establishment and any associated process for the Service User authorization (e.g., credential collection).

5.13.2   Requirement for priority before service invocation

The 3GPP network shall be able to provide priority treatment to an MPS-subscribed UE before the MPS application service invocation (e.g., priority treatment for the default and IMS signaling bearers establishment based on a subscription profile).

The 3GPP network shall be able to provide priority requests for access and attachment to the 3GPP network from an MPS-subscribed UE, including those procedures applied prior to and during the access of subscription related information (e.g., based on the UE membership in a special access class for MPS).

5.14   Recovery/Restoration

The 3GPP system shall allow operational measures to expedite service recovery and restoration (i.e., service restoration after failure/unavailability). Should a disruption occur, MPS shall be re-provisioned, repaired, or restored to required service levels on a priority basis subject to regional/national regulatory requirements and operator policy.

5.15   Quality of Service (QoS)

In certain cases, the QoS characteristics (e.g., packet delay and packet loss) for an MPS session may be the same as the underlying communication service (e.g., voice, video or data) used to support the MPS session, with the MPS session being provided priority treatment subject to regional/national regulatory and operator policies. In other cases, there may be need to request specific QoS characteristics for the MPS session (e.g., specific data communications as described in clause 5.4a).

The 3GPP network shall allow selection and/or configuration of QoS rule(s) appropriate for MPS Voice, Video and Data.

The 3GPP network shall allow enforcement of QoS rule(s) for MPS Voice, Video and Data.

6 MMI aspects

In the case when MPS invocation is based on the presence of an MPS-specific service code entered by the originating Service User, this specific service code must be defined for the 3GPP network to recognize such an invocation.

The 3GPP network supporting on-demand invocation of MPS shall recognize a service code indicating a request for MPS.

The choice of an MPS-specific service code is a regional/national and operator matter.

7 Security and privacy

7.1 General

Operators support and use a wide range of security tools and capabilities to protect the 3GPP system and all supported application services. It is important that appropriate measures be taken to ensure that the use of these security capabilities does not negatively impact MPS.

Use of security mechanisms (e.g., intrusion detection / prevention systems, deep packet inspection, and encryption) shall not interfere with priority treatment mechanisms supporting authorized MPS usage.

7.2 Access Control

Access to MPS shall be determined based on the subscriber's profile. A level of authorisation in addition to authorisation to use the IMS is required.

Unauthorized access to MPS shall be prevented.

7.3 Integrity

The 3GPP system shall be capable of providing integrity protection to MPS signalling and media bearers for voice, video, and data.

7.4 Confidentiality/Privacy

The 3GPP system shall be capable of providing confidentiality protection to MPS signalling and media bearers for voice, video, and data as appropriate.

The 3GPP system shall be capable of maintaining anonymity of the originating Service User to the terminating party, if requested by the originating Service User.

7.5 Use of Encryption

If encryption is used on MPS communication, priority information shall be accessible to all network elements which have to understand and process that priority information.

8 Charging aspects

A network supporting MPS shall be capable of recording the following charging information, in addition to non-MPS information:

- MPS invocation attempt and successful session set-up,

- Session bearers (originations and/or terminations) on which MPS was used to gain access to resources,

- Recording of MPS information, e.g., priority level.

Annex A (informative):
Change history

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<tr><td>SP-69</td><td>SP-150537</td><td>S1-152681</td><td>22.153</td><td>0024</td><td>3</td><td>Rel-14</td><td>F</td><td>MPS priority during initial Attach</td><td>14.0.0</td><td>14.1.0</td><td>MPS_Mods</td></tr>
<tr><td>SP-70</td><td>SP-150751</td><td>S1-154442</td><td>22.153</td><td>0025</td><td>1</td><td>Rel-14</td><td>F</td><td>Addition of end-to-end-cases in general description</td><td>14.1.0</td><td>14.2.0</td><td>MPS_Mods</td></tr>
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<tr><td>SP-70</td><td>SP-150751</td><td>S1-154444</td><td>22.153</td><td>0027</td><td>1</td><td>Rel-14</td><td>F</td><td>Fix inconsistent requirements on invocation of MPS priority.</td><td>14.1.0</td><td>14.2.0</td><td>MPS_Mods</td></tr>
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<tr><td>SP-71</td><td>SP-160097</td><td>S1-160332</td><td>22.153</td><td>0029</td><td>1</td><td>Rel-14</td><td>F</td><td>Text alignment for terminating UE option</td><td>14.2.0</td><td>14.3.0</td><td>MPS_Mods</td></tr>
<tr><td>SP-71</td><td>SP-160097</td><td>S1-160333</td><td>22.153</td><td>0030</td><td>1</td><td>Rel-14</td><td>F</td><td>Update to Priority Data Bearer Service</td><td>14.2.0</td><td>14.3.0</td><td>MPS_Mods</td></tr>
<tr><td>SP-71</td><td>SP-160097</td><td>S1-160334</td><td>22.153</td><td>0031</td><td>1</td><td>Rel-14</td><td>B</td><td>MPS Anonymity Requirement</td><td>14.2.0</td><td>14.3.0</td><td>MPS_Mods</td></tr>
<tr><td>SP-72</td><td>SP-160356</td><td>S1-161096</td><td>22.153</td><td>0032</td><td></td><td>Rel-14</td><td>D</td><td>Editorial Corrections</td><td>14.3.0</td><td>14.4.0</td><td>MPS_Mods</td></tr>
<tr><td>SP-72</td><td>SP-160356</td><td>S1-161097</td><td>22.153</td><td>0033</td><td></td><td>Rel-14</td><td>F</td><td>Update to Handover Materials</td><td>14.3.0</td><td>14.4.0</td><td>MPS_Mods</td></tr>
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<tr><td>SP-72</td><td>SP-160356</td><td>S1-161442</td><td>22.153</td><td>0036</td><td>1</td><td>Rel-14</td><td>F</td><td>Alignment of requirement for priority before service invocation</td><td>14.3.0</td><td>14.4.0</td><td>MPS_Mods</td></tr>
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SP-72	SP-160356	S1-161443	22.153	0037	1	Rel-14	F	MPS priority for CS fallback	14.3.0	14.4.0	MPS_Mods
SP-72	SP-160356	S1-161445	22.153	0040	1	Rel-14	F	Correction of MPS Roaming Requirement	14.3.0	14.4.0	MPS_Mods
SP-72	SP-160356	S1-161558	22.153	0039	3	Rel-14	B	QoS for MPS	14.3.0	14.4.0	MPS_Mods
SP-72	SP-160356	S1-161559	22.153	0034	2	Rel-14	B	Service code for MPS	14.3.0	14.4.0	MPS_Mods
2018-06	-	-	-	-	-	Rel-15	-	Raised to Rel-15 by MCC	14.4.0	15.0.0	-

Date	Meeting	TDoc	CR	Rev	Cat	Subject/Comment	New version
2019-09	SA#85					Raised to Rel-16 without technical change New change history table layout applied.	16.0.0

History

Document history		
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