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Contents

Foreword

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

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Introduction

This Technical Report (TR) presents the results of the feasibility study on Multimedia Priority Service. The intent of this feasibility study is to assess the ability of 3GPP specifications to meet high-level requirements identified for Multimedia Priority Service. This feasibility study consisted of a multi-step process, namely:

- Identify high-level requirements for Multimedia Priority Service.
- Determine relevant 3GPP specifications for Multimedia Priority Service.
- Perform a gap analysis to assess the ability of existing 3GPP specifications to meet the high-level Multimedia Priority Service requirements.

The present document also presents the results of the subsequent feasibility study on Multimedia Priority Service - Phase 2 for Rel-17 identifying new use cases and associated capabilities to account for current and anticipated MPS User needs for priority voice, data, and video communication capabilities.

As defined in this document, Multimedia Priority Service 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, Multimedia Priority Service supports priority sessions an "end-to-end" priority basis.

Multimedia Priority Service is intended to be used by qualified and authorized users, i.e., emergency service personnel, only during times of emergency situations and network congestion. Access to Multimedia Priority Service is limited to key personnel and those with leadership responsibilities and is not intended for use by all emergency service personnel. This is to ensure that emergency service personnel cannot "take over" the network and deny other non-emergency service subscribers a reasonable level of service.

Multimedia Priority Service providers should adhere to uniform, nationwide operating access procedures. Multimedia Priority Service can provide significant benefits for public safety. There may be times during emergencies when non-Service Users will be unable to obtain access to their wireless services (because Multimedia Priority Service personnel are using the channels); nevertheless, the benefits of Multimedia Priority Service outweigh any inconvenience to non-Service Users.

It is assumed that Multimedia Priority Service will be available at all times in equipped markets in both the HPLMN and VPLMN within a country where the PLMN provider is offering the service. The capability for pre-emption could be supported, with the option to turn it on/off depending on regional requirements. Multimedia Priority Service is

applicable to both GERAN and UTRAN and is activated on a per session basis using Multimedia Priority Service procedure described in clause 4.8.

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

1 Scope

This Technical Report (TR) presents the results of the feasibility study on Multimedia Priority Service. The intent of this feasibility study is to assess the ability of 3GPP specifications to meet high-level requirements identified for Multimedia Priority Service. This feasibility study consisted of a multi-step process, namely:

- Identify high-level requirements for Multimedia Priority Service.
- Determine relevant 3GPP specifications for Multimedia Priority Service.
- Perform a Gap Analysis to assess the ability of existing 3GPP specifications to meet the high-level Multimedia Priority Service requirements.

The present document also presents the results of the subsequent feasibility study on Multimedia Priority Service - Phase 2 for Rel-17 identifying new use cases and associated capabilities to account for current and anticipated MPS User needs for priority voice, data, and video communication capabilities. The feasibility study on Multimedia Priority Service - Phase 2 also identifies new potential requirements for the normative stage 1 requirements specified in TS 22.153[9].

Additional functionalities not documented in this TR are considered outside the scope of this TR. Such additional functionality may be on a network-wide basis, nation-wide basis or particular to a group of users..

The Multimedia Priority Service is intended to be utilised for both Voice and Data in the Packet-switched (PS) domain and the IP Multimedia Subsystem (IMS).

The Multimedia Priority Service is intended to interwork with external networks to provide an end-to-end service. Therefore, service interactions with external networks are considered within the scope of this document, although the specification of these interactions may be in other standards. If this occurs, a reference to that specification is made.

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 TS 22.228: "Service requirements for the Internet Protocol (IP) multimedia core network subsystem (IMS); Stage 1".

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

[4] 3GPP TS 24.229: "Internet Protocol (IP) multimedia call control protocol based on Session Initiation Protocol (SIP) and Session Description Protocol (SDP); Stage 3".

[5] 3GPP TS 23.002: "Network architecture".

[6] 3GPP TR 22.952: "Priority Service Guide".

[7] IETF RFC [4412]: "Communications Resource Priority for Session Initiation Protocol (SIP)".

[8] 3GPP TR 22.950: "Priority Service feasibility study".

[9] 3GPP TS 22.153: "Multimedia priority service".

[10] 3GPP TS 22.261: "Service requirements for next generation new services and markets".

[11] IETF RFC 8443: "Personal Assertion Token (PASSporT) Extension for Resource Priority Authorization".

3 Definitions and abbreviations

Refer to [1] for definitions and abbreviations used in this document that are not defined below.

3.1 Definitions

Service User: Subscriber to Multimedia Priority Service

3.2 Abbreviations

DTS	Data Transport Service
MMTEL	Multimedia Telephony
MPS	Multimedia Priority Service
NS/EP	National Security / Emergency Preparedness
OTT	Over-The-Top
PASSPorT	Personal Assertion Token
PIN	Personal Identification Number
SIP RPH	Session Initiation Protocol Resource Priority Header
VPN	Virtual Private Network

4 High-level requirements

The following clauses describe the high-level requirements to support Multimedia Priority Service. These high-level requirements are used as a basis for the gap analysis described in Clause 6.

4.1 Priority Session origination

A session shall receive priority ingress treatment (priority access to voice or traffic channels) for session origination, when the session is setup by a Service User using the multimedia priority service procedure described in clause 4.8.

4.2 Priority Session establishment to called party

A session shall receive priority egress treatment (priority access to voice or traffic channels) for session delivery to the terminating resource/user (e.g., called party), when the session is setup by a Service User using the priority service procedure described in clause 4.8.

4.3 Priority Session progression

The Service User shall receive priority session treatment/progression through the mobile network(s). A priority session should be given higher priority over normal sessions in the originating mobile network, the interconnected networks and the terminating network.

4.4 Priority radio resource queuing

Multimedia Priority Service assumes a signalling channel is available.

When a Multimedia Priority Service session encounters a "no radio available" condition in the session path involving an ingress or egress air-interface, or both, and,

- at session origination, and upon recognition of the Multimedia Priority Service code, the Multimedia Priority Service session request is queued in the cell serving the calling party and processed for the next available radio channel in that cell in accordance with the caller's priority level and session initiation time.
- at session termination upon recognition of a priority session indication in an incoming session request, the Multimedia Priority Service session request is queued in the cell serving the called party and processed for the next available radio channel in that cell in accordance with the session's priority level and request arrival time.

4.5 Priority levels

A Service User shall be assigned one of *n* priority levels. Priority levels are defined as 1, 2, 3, …, *n* , with 1 being the highest priority level and *n* being the lowest priority level.

4.6 Invocation on demand

Multimedia Priority Service is invoked only when requested and an idle voice or traffic channel required for an origination request is not available.

If an idle voice or traffic channel is available when Multimedia Priority Service is requested, the origination request is allowed to proceed normally without delay.

Invocation of Multimedia Priority Service at ingress access (origination), during session progression (end-to-end), or egress access (termination) is considered complete when one of the following occurs:

- A radio (voice or traffic) channel is assigned to the session (at origination or termination),
- The loss of radio contact or roaming to another PLMN provider's system (at origination only),
- The Service User cancels the request,
- Expiration of the maximum allowed time to hold for the next available radio (voice or traffic) channel (at origination or termination), or
- Deletion of the Multimedia Priority Service request due to arrival of a higher priority request coupled with lack of queue capacity (at origination or termination).

4.7 Applicability to telecommunications services

Multimedia Priority Service shall be applicable to PS-based services.

4.8 Multimedia Priority Service code/identifier

Multimedia Priority Service is requested by including the Multimedia Priority Service code/identifier in the origination request.

4.9 Roaming

Multimedia Priority Service shall be able to be supported during roaming when the roaming network supports Multimedia Priority Service.

4.10 Handover

Multimedia Priority Service shall be able to be supported during handover.

4.11 Charging

The system should record the following Multimedia Priority Service charging information, in addition to non-Multimedia Priority Service information:

- Multimedia Priority Service invocation attempts.
- Session information (origination and/or termination) on which Multimedia Priority Service was used to gain access to the radio channel.
- Recording of appropriate Multimedia Priority Service information (e.g., Priority Level).

4.12 Queuing requests for bearer resources

Multimedia Priority Service shall be able to support queuing of Multimedia Priority Service requests for bearer resources. Queuing request provides the capability to place a Multimedia Priority Service request that has experienced a congestion condition for bearer resources into a queue associated with the resource until the resource becomes available or until a maximum queuing time has expired.

4.13 Reversion from UTRAN to RAN

As a service provider option, when resources are congested or not available on UTRAN, it shall be possible for Multimedia Priority Service calls intended to be established on UTRAN to revert to RAN. Reversion may occur for ingress or egress radio access.

5 Additional description of multimedia priority service

5.1 Priority Session setup/invocation

If a Service User invokes Multimedia Priority Service and sufficient resources (e.g., a radio (voice or traffic) channel) are available, then session establishment proceeds in the originating system. The session is given priority treatment during establishment.

If a Service User invokes Multimedia Priority Service but sufficient resources (e.g., a radio (voice or traffic) channel) are not available, if the queue for the resource is not full, then the session request is queued in accordance with the user's priority level and session request initiation time, until sufficient resources (e.g., the next available radio (voice or traffic) channel in the cell) are available. The user should be given an indication that session establishment is progressing. The network treats the user as busy, if applicable for the bearer service, while a multimedia priority session request for the user is queued.

If a Service User invokes Multimedia Priority Service but sufficient resources (e.g., a radio (voice or traffic) channel) are not available, if the queue for the resource is full, and if the user's Multimedia Priority Service priority is higher than one or more Priority Service session requests already in the queue, then the lowest, most recent session request in the queue is dropped from the queue. The user's session request is placed in the queue in accordance with the user's priority level and session request initiation time. The user should be given an indication that session establishment is progressing. The network treats the user as busy, if applicable for the bearer service, while a multimedia priority session request for the user is queued.

When sufficient resources (e.g., a radio (voice or traffic) channel) become available and are assigned to the session, session establishment proceeds in the originating system.

It is desirable that if the system changes the resources allocated to a Service User (e.g., cell handover), then the session establishment should proceed as if the resources had remained the same (e.g., queue status).

The following indications should be provided to the Service User:

- Acceptance of a Multimedia Priority Service request.
- Rejection of a Multimedia Priority Service request.
- Loss of a pending request (e.g., loss of radio contact and possibly roaming to another system).

A Multimedia Priority Service session request may be removed from the queue by the Service User cancelling the request. The session request shall also be removed by the system, if radio contact is not maintained with the requesting UE.

5.2 Priority session progression

The Multimedia Priority Service session request receives priority treatment for session establishment to interconnected networks supporting priority.

5.3 Priority session establishment to called party

If sufficient resources (e.g., a terminating radio (voice or traffic) channel) are available, then the session is established with the called party.

If sufficient resources (e.g., a terminating radio (voice or traffic) channel) are not available and the queue for the resource serving the called party is not full, then the session request is queued in accordance with the session's priority level, until sufficient resources (e.g., the next available radio (voice or traffic) channel in the cell) serving the called party are available.

If sufficient resources (e.g., a terminating radio (voice or traffic) channel) are not available, the queue for the resource serving the called party is full, and the session's priority level is higher than one or more Multimedia Priority Service session requests in the queue, then the lowest, most recent session request in the queue is dropped from the queue. The user's session request is placed in the queue in accordance with the session's priority level.

When sufficient resources (e.g., a terminating radio (voice or traffic) channel) become available and are assigned to the session, the session is established with the called party.

It is desirable that if the system changes the resources allocated to the called party (e.g., cell handover), then the session establishment should proceed, as if the resources had remained the same (e.g., queue status).

5.4 Exception procedures or unsuccessful outcome

During session establishment, the following exceptions or unsuccessful outcomes can occur:

- If a non-Service User invokes Multimedia Priority Service, then session request is not allowed to proceed and the session is dropped.

- If a Service User invokes Multimedia Priority Service but the UE times out while the session request is undergoing Multimedia Priority Service queue processing, then the UE returns to the null state and the session is dropped.
- If a Service User invokes Multimedia Priority Service, sufficient resources (e.g., a radio (voice or traffic) channel) are not available, and the queue for the resource is full, and the user's Multimedia Priority Service priority is lower than all of the Multimedia Priority Service session requests in the queue, then the session is dropped.
- If a Service User invokes Multimedia Priority Service, and is queued for a resource, but the user loses coverage, then the session request is removed from the queue and is dropped.
- If a Service User invokes Multimedia Priority Service, and is queued for a resource, but the maximum allowed time in queue expires before a resource becomes available in the cell, then the session request is removed from the queue and is dropped.
- If a Service User invokes Multimedia Priority Service, and is queued for a trunk resource (if applicable for the bearer service), but the user loses coverage, then the session request is removed from the trunk queue and is dropped.
- If a Service User invokes Multimedia Priority Service, and is queued for a trunk resource (if applicable for the bearer service), but the maximum allowed time in queue expires before a trunk resource becomes available in the cell, then the session request is removed from the trunk queue and is dropped.

At session establishment to the Called Party, the following exceptions or unsuccessful outcomes can occur:

- If sufficient resources (e.g., a radio (voice or traffic) channel) are not available and the queue for the cell is full, but the calling party's priority is lower than all of the Priority Service session requests in the queue, then the session is not established and the Service User is given an appropriate indication.
- If the session request is queued for a resource but the called party's UE loses coverage, then the session request is removed from the queue and the Service User is given an appropriate indication.
- If the session request is queued for a resource but the maximum allowed time in queue expires before a resource becomes available in the designated terminating cell, then the session request is removed from the queue and the Service User is given an appropriate indication.

6 Multimedia priority service gap analysis

6.1 IP multimedia subsystem (IMS)

IP Multimedia Subsystem (IMS) is specified in:

- 3GPP TS 22.228, "Service requirements for the Internet Protocol (IP) multimedia core network subsystem (IMS); Stage 1" [2].
- 3GPP TS 23.228, "IP Multimedia Subsystem (IMS); Stage 2" [3].
- 3GPP TS 24.229, "Internet Protocol (IP) multimedia call control protocol based on Session Initiation Protocol (SIP) and Session Description Protocol (SDP); Stage 3" [4].

6.2 Summary of IMS capabilities

The IMS comprises all 3GPP capabilities and elements for provision of IP multimedia services. This includes signalling and bearer related capabilities and network elements as specified in 3GPP TS 23.002 [5].

To achieve access independence and to facilitate interoperation with terminals across the Internet, the IMS supports protocols based on IETF "Internet standards". For example, IP multimedia services are supported based on an IETF defined session control capability (i.e., Session Initiation Protocol (SIP)).

The IMS enables PLMN operators to offer their subscribers IP multimedia services based on and built upon Internet applications, services and protocols. The IMS is intended to enable the convergence of, and access to, voice, video, messaging, data and web-based technologies for the wireless user.

6.3 Support for Multimedia Priority Service

The IMS provides a useful set of functions and resources to support Multimedia Priority Service. 3GPP TS 24.229 [4] specifies IP multimedia session/call control protocol based on Session Initiation Protocol (SIP) and Session Description Protocol (SDP), which apply to Multimedia Priority Service.

IETF RFC [4412] [7], "Communications Resource Priority for Session Initiation Protocol (SIP)" specifies the protocol and procedures for two SIP header fields for communicating request for resource priority, namely "Resource-Priority" and "Accept-Resource- Priority". The "Resource-Priority" request header field is included in a SIP request to invoke procedures for prioritized access to resources. The "Accept-Resource-Priority" response header field is included in a SIP response to indicate the resource values that a SIP user agent server can process.

In addition, IETF RFC [4412] [7] specifies five unique namespaces for application of the "Resource-Priority" and "Accept-Resource- Priority" capability, namely, "DSN", "DRSN", "Q735", "ETS" and "WPS". The "WPS" namespace is derived from "Wireless Priority Service" as described in GSM/UMTS [3GPP TR 22.952] [6] and other wireless technologies.

Based on this analysis, a gap exists in that 3GPP TS 24.229, v 7.x.y [4] does not include support for IETF RFC [4412] [7].

IETF RFC [4412] [7] should be considered as one of the possible solutions to support Multimedia Priority Service.

6a Results of feasibility study on MPS - Phase 2

This clause provides the potential requirements identified in the feasibility study on Multimedia Priority Service – Phase 2 for Rel-17.

6a.1 MPS for MMTEL voice consolidated requirements

6a.1.1 Authentication and authorization

The 3GPP system shall support means for a visited PLMN to verify with the home PLMN that a UE is authorized for international MPS, and to authorize an MPS MMTEL voice call.

6a.1.2 Policy

The 3GPP system shall support measures to verify policy and admit an incoming MPS for MMTEL voice or voice conference call/session received from another network with priority.

6a.1.3 Invocation/revocation

The 3GPP system shall support means for an MPS Service User host using a predetermined method to:

- initiate MPS for all participants of an MMTEL voice conference call, or
- upgrade all participants on an ongoing MMTEL voice conference call to MPS.

The 3GPP system shall provide MPS for a late participant joining an MPS for MMTEL voice conference after MPS was activated for all participants.

NOTE: When MPS is invoked for all participants on the call, the user priority level is based on the host MPS User, except in cases where an individual participant used MPS to join the conference with a higher user priority level, the higher user priority level is kept.

The 3GPP system shall revoke MPS for the following cases:

- upon end of an MPS MMTEL voice call, or an MPS MMTEL voice conference call from a UE with an MPS subscription, and the UE shall return to normal conditions (i.e., use of normal MMTEL voice service),
- upon end of an MPS MMTEL voice call, or an MPS MMTEL voice conference call from a UE that does not have an MPS subscription, and the UE shall return to normal conditions (i.e., use of normal voice service), and
- upon end of an MPS MMTEL voice conference call where MPS was provided to all participants on the voice conference call, and the UEs shall return to normal conditions (i.e., use of normal MMTEL voice service).

The 3GPP system shall revoke MPS for an individual participant leaving an ongoing MPS for MMTEL voice conference where MPS is activated for all participants.

When an MPS MMTEL voice call or an MPS MMTEL voice conference call is not explicitly ended, upon UE detachment/deregistration (e.g., orderly power down), the 3GPP system in the RPLMN shall automatically revoke MPS such that MPS priority treatment shall not automatically apply to subsequent calls upon subsequent registration.

The 3GPP system shall support means to retain MPS for an MMTEL voice conference call as activated during transient network degradation conditions (e.g., during short radio link interruption caused by poor performance in anticipation of restoration) for each participant in the MPS conference) only when the MPS session is re-verified.

6a.1.4 Charging

The 3GPP system shall associate MPS related charging events with the MPS subscription.

6a.1.5 MMI

The 3GPP system shall support a unique service identifier for international MPS.

6a.1.6 Media

When MPS MMTEL voice is activated by an MPS Service User, the 3GPP system of the MPS Service Provider RPLMN shall provide priority treatment to the audio media flows once the MPS Service User is authenticated and authorized by the 3GPP system.

6a.1.7 Signalling

The 3GPP system shall be able to provide priority to MPS Service User invocation signalling in the network once the request is identified by the 3GPP system.

The 3GPP system shall support a means for MPS Voice activation when normal service is congested at the request of the roaming MPS Service User.

6a.1.8 General support of service

The 3GPP system shall support means for a MPS Service User to initiate a MPS for MMTEL voice call during international roaming using a UE with a subscription configured for MPS with the MPS capable visited PLMN outside the home country based on operator policy (e.g., bi-lateral agreements between operators).

The 3GPP system shall support MPS for MMTEL voice and voice conference calls between 3GPP networks supporting MPS.

NOTE 1: Intermediate 3GPP networks between an originating network and terminating network should allow MPS priority markings to be passed transparently based on operator policy.

The 3GPP system shall support means for an authorized MPS Service User to initiate MPS for an MMTEL voice or voice conference call from a UE that does not have an MPS subscription using a predetermined method.

NOTE 2: The predetermined method used to make an MPS call using a UE without an MPS subscription (e.g., access code) is outside of 3GPP scope.

6a.2 MPS for DTS consolidated requirements

6a.2.1 Authentication and authorization

The 3GPP system shall support means to authenticate and authorize an MPS for DTS session request from a UE with an MPS subscription.

The 3GPP system shall support means to authenticate and authorize an MPS Service User for a MPS for DTS session request from a UE that does not have an MPS subscription.

The 3GPP system shall support means to authenticate and authorize an MPS for DTS session request from an IoT device with an MPS subscription.

The 3GPP system shall support means to authenticate and authorize an MPS capable Enterprise Network requesting activation of MPS for DTS for a UE with an MPS subscription.

6a.2.2 Roaming

The 3GPP system shall support means for a visited PLMN, including a visited PLMN outside of the home country, to verify with the home PLMN that a MPS for DTS session request from a UE is authorized (i.e., the UE is authorized for MPS) and to authorize an MPS for DTS session.

6a.2.3 Security and policy

The 3GPP system shall support security capabilities for an MPS Service Provider PLMN to verify an MPS capable enterprise network's authorization to request MPS for DTS activation for an MPS subscribed UE or IoT device associated with the enterprise network.

6a.2.4 Handover

MPS priority treatment shall continue following handover within the Registered PLMN/Equivalent PLMN (RPLMN/EPLMN).

6a.2.5 Invocation and revocation

The 3GPP system shall support means for an MPS Service User to initiate an MPS for DTS session from a UE with an MPS subscription.

NOTE 1: The method for DTS invocation may include (a) using a web browser to enter a predetermined address (e.g., URL) or (b) using a specialized MPS application on the UE, or (c) using a user-selectable option provided as part of a VPN client in the UE.

The 3GPP system shall support means for a MPS Service User to initiate an MPS for DTS session to an MPS capable Enterprise Network using a UE with an MPS subscription.

The 3GPP system shall support means for an MPS Service User to initiate an MPS for DTS session from a UE that does not have an MPS subscription using a predetermined method.

NOTE 2: The predetermined method used for DTS invocation using a UE without an MPS subscription (e.g., access code) is outside of 3GPP scope.

The 3GPP system shall support means for an IoT device to initiate an MPS for DTS session using a specialized MPS application on the IoT device.

The 3GPP system shall support receiving and authenticating MPS for DTS invocation requests from authorized MPS Service Users via public non-3GPP networks.

NOTE 3: The intent of the above requirement is to allow an authorized MPS Service User to send a request via the Internet to establish an MPS for DTS session for one or more active PDNs/DNs of a UE.

The 3GPP system shall support discovery of active PDN/DN connections upon receipt of an MPS for DTS invocation request and perform selection of one or more PDNs/DNs for DTS invocations for an authorized MPS Service User.

The 3GPP system shall support means for a Service User or IoT device to end an MPS for DTS session, or MPS for DTS session to an MPS capable Enterprise Network for the cases:

- an MPS Service User using a UE with an MPS subscription,
- an MPS Service User using a UE that does not have an MPS subscription, or
- an IoT device with an MPS subscription.
- If MPS for DTS is not explicitly revoked by the MPS Service User or IoT device, the 3GPP system in the RPLMN shall automatically revoke the DTS:
- upon UE detachment/deregistration (e.g., power down), or
- when the connections under control of the DTS session are released (e.g., when an MPS capable enterprise closes all the connections but fails to explicitly release the DTS).

The 3GPP system shall retain MPS for DTS as activated for an implementation dependent time during a short interruption in network connectivity, e.g., due to a radio link failure caused by poor error performance during times of radio link congestion, in anticipation of restoration of connectivity.

The 3GPP system shall support means for an authorized MPS capable enterprise network to request activation of MPS for DTS for the following cases:

- a specific MPS subscribed UE or IoT device, and
- a group of MPS subscribed UEs or IoT devices.

The 3GPP system shall support means for an authorized MPS capable enterprise network to explicitly requests to end a MPS for DTS session or group of MPS for DTS sessions while maintaining basic connectivity to the MPS subscribed UE(s) or IoT device(s).

The 3GPP system shall support means for an MPS Service User to initiate an MPS for DTS session from a UE with an MPS subscription when roaming in the UE configured visited PLMN outside the home country.

NOTE 4: The method for MPS for DTS invocation may include (a) using a web browser to enter a predetermined address (e.g., URL) or (b) using a specialized MPS application on the UE, or (c) using a user-selectable option provided as part of a VPN client in the UE.

The 3GPP system shall support means for an MPS Service User to explicitly ends an MPS for DTS session from a UE with an MPS subscription when roaming in the UE configured visited PLMN outside the home country.

The 3GPP system shall support means to revoke MPS and continue the DTS session without MPS when operator policy for the maximum allowed duration of an MPS for DTS session is exceeded.

6a.2.6 Media

The 3GPP system (i.e., MPS Service Provider PLMN) shall provide priority treatment to the affected media flows when a MPS for DTS session is activated.

The 3GPP system (i.e., MPS Service Provider PLMN) shall provide priority treatment to the affected media flows end-to-end between the UE and the enterprise network when MPS for DTS to an authorized MPS capable enterprise network is activated.

6a.2.7 QoS

The 3GPP system shall be capable of supporting a set of default QoS characteristics for an active MPS for DTS session.

The 3GPP system shall be capable of verifying authorization for a requested QoS modification to an active MPS for DTS session.

The 3GPP system shall be capable of making authorized QoS modifications for the media flows or a subset of the media flows of an active MPS for DTS session.

The 3GPP system shall support a mechanism to allow an MPS Service User to request QoS modifications for an active MPS for DTS session to support Over The Top (OTT) applications.

The 3GPP system shall support a mechanism to provide an MPS Service User with an indication that a requested QoS modification of an active MPS for DTS session was successful.

6a.2.8 Signalling

The 3GPP system shall support a means for MPS for DTS activation when data service is congested at the request of the MPS Service User, or IoT device.

The 3GPP system shall support a means for MPS for DTS activation when data service is congested at the request of a roaming MPS Service User.

6a.2.9 General support of service

The 3GPP system shall support MPS for DTS, a generic priority packet transport service that applies independently of the specific data application being used, using an UE with an MPS subscription.

The 3GPP system shall support an end-to-end MPS for DTS connection between an MPS subscribed UE and an MPS capable enterprise network.

The 3GPP system shall support authorized MPS capable enterprise network activation of MPS for DTS to MPS subscribed UEs on demand based on operator policy.

The 3GPP system shall support means for an MPS Service User to initiate an MPS for DTS session during international roaming using a UE configured for MPS with the MPS capable visited PLMN outside the home country based on operator policy (e.g., bi-lateral agreements between operators).

The 3GPP system shall support an MPS subscription that is not associated with a particular UE to allow an MPS Service User to invoke MPS from a UE that does not have an MPS subscription.

The 3GPP system shall support authorized MPS capable enterprise network activation of MPS for DTS for remote MPS subscribed IoT devices associated with the enterprise network on demand based on operator policy.

6a.3 MPS for video consolidated requirements

6a.3.1 Authentication and authorization

The 3GPP system shall support means to authenticate and authorize an MPS MMTEL video or video conference call request from a UE with an MPS subscription.

The 3GPP system shall support means to authenticate and authorize a MPS Service User request for an MPS MMTEL video or video conference call from a UE that does not have an MPS subscription.

The 3GPP system shall support means for a visited PLMN, including a visited PLMN outside of the home country, to verify with the home PLMN that a MPS MMTEL video request from a UE is authorized (i.e., the UE is authorized for MPS) based on operator policy (e.g., bi-lateral agreements between operators).

The 3GPP system shall support a means for the home PLMN to authenticate and authorize an MPS MMTEL video call or video conference call, initiated from a UE with an MPS subscription in a visited PLMN outside of the home country based on operator policy (e.g., bi-lateral agreements between operators).

The 3GPP system shall support means to authenticate and authorize a request to establish or upgrade all participants of an MMTEL video conference call to MPS priority.

6a.3.2 Security and policy

The 3GPP system shall support measures to verify policy and admit an incoming MPS for MMTEL video or video conference call/session received from another network with priority.

6a.3.3 Invocation and revocation

The 3GPP system shall support means for an MPS Service User using a predetermined method to:

- initiate MPS for an MMTEL video call, or an MPS MMTEL video conference call, using a UE with an MPS subscription,
- upgrade an established MMTel video call, or an established MMTEL video conference call, to MPS using a UE with an MPS subscription, or
- initiate MPS for an MMTEL video call, or an MPS MMTEL video conference call, from a UE that does not have an MPS subscription.

The 3GPP system shall support means for an internationally roaming MPS Service User to:

- initiate MPS for an MMTEL video call, or an MPS MMTEL video conference call, using a UE with an MPS subscription, or
- upgrade an established MMTEL video call, or an established MMTEL video conference call, to MPS using a UE with an MPS subscription.

The 3GPP system shall support means for an MPS Service User using a predetermined method to:

- initiate MPS for all participants of an MMTEL video conference call, or
- upgrade of all participants on an ongoing MMTEL video conference call to MPS.

The 3GPP system shall provide MPS for a late participant joining an MPS for MMTEL video conference after MPS was activated for all participants.

The 3GPP system shall revoke MPS for the following cases:

- upon end of an MPS MMTEL video call, or an MPS MMTEL video conference call from a UE with an MPS subscription, and the UE shall return to normal conditions (i.e., use of normal MMTEL video service),
- upon end of an MPS MMTEL video call, or an MPS MMTEL video conference call from a UE that does not have an MPS subscription, and the UE shall return to normal conditions (i.e., use of normal video service), and
- upon end of an MPS MMTEL video conference call where MPS was provided to all participants on the video conference call, and the UEs shall return to normal conditions (i.e., use of normal MMTEL video service).

When an MPS MMTEL video call or an MPS MMTEL video conference call is not explicitly ended, upon UE detachment/deregistration (e.g., orderly power down), the 3GPP system in the RPLMN shall automatically revoke MPS such that MPS priority treatment shall not automatically apply to subsequent calls upon subsequent registration.

The 3GPP system shall support means to retain MPS for an MMTEL video call or MMTEL video conference call as activated during transient network degradation conditions (e.g., during short radio link interruption caused by poor performance in anticipation of restoration) only when the MPS session is re-verified.

6a.3.4 MMI

The 3GPP system shall support a unique MMI service code for international MPS.

6a.3.5 Media

The 3GPP system shall support a means to differentiate the priority between the audio and video streams of a given MPS MMTEL video call.

The 3GPP system shall support a means to differentiate the priority between the audio and video streams of MPS participants on an MPS MMTEL video conference call.

The 3GPP system shall retain the audio of an MPS MMTEL video call when both the audio and video cannot be supported but the audio can be supported.

The 3GPP system shall retain the audio of the MPS participants on an MPS MMTEL video conference call when both the audio and video cannot be supported but the audio can be supported.

The 3GPP system shall support priority re-establishment of the video media when an MPS MMTEL video call, or an MPS MMTEL video conference call, is in progress with only audio media and the conditions which previously blocked the video media are no longer applicable.

NOTE: This requirement does not imply the need to introduce a new IMS feature. It adds the need for priority treatment using the existing IMS feature for re-establishment of the video media.

The 3GPP system shall provide priority treatment to the audio and video media flows, when MPS is activated for an MMTel video call or MMTEL video conference call.

The 3GPP system shall provide priority treatment to the affected audio and video media flows when MPS is activated by an internationally roaming MPS Service User for an MMTEL video call, or MMTEL video conference call.

6a.3.6 Signalling

The 3GPP system shall provide priority treatment to the affected signalling when MPS is activated for an MMTEL video call, or MMTEL video conference call.

The 3GPP system shall provide priority treatment to the affected signalling when MPS is activated by an internationally roaming MPS Service User for an MMTEL video call, or MMTEL video conference call.

6a.3.7 Inter-network

The 3GPP system shall support means to identify that an incoming MMTEL voice, video, or video conference call/session from another network is an MPS call/session based on the MPS priority markings and to handle it with priority.

The 3GPP system shall allow MPS priority markings to be signalled across international boundaries.

The 3GPP system shall support means to complete an incoming MPS for MMTEL voice, voice conference, video, or video conference call/session to a terminating UE with priority including priority paging.

6a.3.8 General support of service

The 3GPP system shall support MPS for MMTEL video and video conference calls/sessions.

The 3GPP system shall support means for an MPS Service User to initiate MPS for an MMTEL video or video conference call/session while internationally roaming using a UE with a subscription configured for MPS with the MPS capable visited PLMN outside the home country based on operator policy (e.g., bi-lateral agreements between operators).

The 3GPP system shall support MPS for MMTEL video and video conference calls/sessions between two 3GPP networks supporting MPS.

NOTE 1: Intermediate 3GPP networks between an originating network and terminating network should allow MPS priority markings to be passed transparently based on operator policy agreements.

The 3GPP system shall support means for an authorized MPS Service User to initiate MPS for an MMTEL video or video conference call/session from a UE that does not have an MPS subscription using a predetermined method.

NOTE 2: The predetermined method used to make an MPS call using a UE without an MPS subscription (e.g., access code) is outside of 3GPP scope.

The 3GPP system shall support MPS for streaming video.

NOTE 3: MPS for streaming video is provided as an OTT service using MPS for DTS.

6a.4 Consolidated security considerations requirements

6a.4.1 Attestation of authorized of MPS priority

The originating 3GPP system shall provide a means to securely attest to MPS authorization for the session.

The 3GPP system shall provide a means to securely verify the attestation of MPS authorization received from the originating network for the session.

7 Conclusion

The objectives of this feasibility study for Multimedia Priority Service were to:

- Identify high-level requirements for Multimedia Priority Service.
- Determine relevant 3GPP specifications for Multimedia Priority Service.
- Perform a Gap Analysis to assess the ability of existing 3GPP specifications to meet the high-level Multimedia Priority Service requirements.

The following high-level requirements were identified to support Multimedia Priority Service:

- Priority Session Origination,
- Priority Session Establishment,
- Priority Session Progression,
- Priority Radio Resource Queuing,
- Priority Levels,
- Invocation on Demand,
- Applicability to Telecommunications Services,
- Multimedia Priority Service Code/Identifier,
- Roaming,
- Handover,
- Charging Data Record,
- Queuing Requests for Bearer Resources,
- Revision from UTRAN to RAN.

The following primary capabilities were identified to support Multimedia Priority Service:

- IMS,
- IETF Resource Priority Header.

This Feasibility Study recommends that a new TS be developed to capture the MPS stage 1 requirements.

7a Feasibility study on MPS - phase 2 conclusion

The study identified and analysed a number of use cases to account for current and anticipated MPS User needs for priority voice, video and data communications. Potential requirements associated with the use cases are identified and documented in clause 6 of the present document.

The consolidated potential requirements in clause 6 of the present document should be used as the basis to update the normative Rel-17 requirements in TS 22.153 [9].

Annex A:
Use Cases

Overview and assumptions

3GPP TR 22.950 Priority Service feasibility study [8] and 3GPP TR 22.952 Priority Service Guide [6] describe Priority Service support for circuit switched voice service. Similar service (both real time and non-real time) is also required for the non-circuit switched service. The following use cases are for initial discussion to begin the feasibility study on Multimedia Priority Service (MPS).

Service Users should be able to initiate MPS in the IP Multimedia Subsystem (IMS) and should receive priority over other subscribers in the establishment and completion of a voice call or a data/multimedia session. A Service User should be able to establish/complete a voice call, initiate/complete a data/multimedia session, or a combination of both concurrently.

Service Users shall be able to use any IMS Basic Multimedia Service (non-priority) to which they are subscribed. Should a service disruption occur, Priority Service voice and data services must be capable of being re-provisioned, repaired, or restored to required service levels on a priority basis.

The system should be able to identify Service Users and set a priority indicator to identify or mark the priority traffic (voice calls or data/multimedia sessions). There should be procedures and processes to handle priority service traffic that maintains the end quality of service (QoS) to support the communication. The types of processes required for MPS include priority access, priority call set up or session establishment, priority termination, and exemption from restrictive management controls.

MPS users should be given service regardless of user location or deployment status. Means by which this may be accomplished include "follow me", functional numbering, call forwarding, or functional directories.

User perspective (user interface)

A user's main interface is a User Equipment (UE). While the UE interface may be proprietary to the manufacturer, the interaction between the user and the network should be uniform.

The user should be able to make a priority call and use priority data services in the IMS, using any UE. Either the network or the UE may support the authorization function for MPS. If the UE does the authorization, there should be a user-involved authentication (e.g., Personal Identification Number (PIN)). The user should not have multiple telephone numbers/Public User Identities.

There should be a user-friend MMI or invocation mechanism to initiate and authenticate MPS. MPS users should be able to invoke MPS either as a permanent subscription or on a per-call/per-session basis. Access can be via the use of a special code/dialing sequence/URL and/or a PIN.

Generic use cases

The generic requirements for MPS are identical to the generic requirements for Basic Voice and Multimedia Services. A user should be able to invoke priority in all IP multimedia applications that are provisioned to support Service Users in a network. These include, but are not limited to, email, instant messaging, remote printing, web access, file transfer, broadcast/multicast video, interactive video, and domain name server (DNS) lookups. Also included is interworking with existing Priority Service and non-Priority Service voice and data networks for both fixed (e.g., PSTN, ISDN, internet, etc.) and mobile users.

The user should be able to make a voice call in a congested area (due to either increased call volume or infrastructure damage).

The user should be able use data services in a congested area (due to either increased call volume or infrastructure damage).

The user should be able to send priority and receive priority short messages. The user should have the ability to reject or accept the message. Again, the initiator sets the priority level of the session.

The user should be able send/receive e-mail, voice-mail, fax etc.

The user should be able to query on-line databases and make a transaction (e.g., buy blankets, cots, water, etc).

The user should be able to take video footage of a disaster area and should be able to transmit this video to a response centre outside the disaster area.

The user is a medical technician and should be able to transmit a digital picture of a patient's condition to a remote hospital for advice.

Detailed use case scenario #1 (initiation of a Single Media Session)

As the user attempts to initiate the session, the network recognizes the user as a Service Users requesting priority service and allocates network resources to this user first before servicing other non-priority subscribers attempting to initiate sessions.

If network resources are not immediately available, the network places the Service Users in queue for the next available resource. The queue is managed by priority level and (within each level) time of entry into the queue.

The network provides feedback to the Service Users (either tones or short messages) on the status of their session.

Detailed use case scenario #2 (support of Multi-Media Sessions)

A Service User is involved in a single media session (i.e., involved in a video-teleconference) and also needs to send an SMS to a different destination. Bandwidth is limited in the congested area, so the Service User lowers the QoS and bandwidth requirements on the video-teleconference so that the SMS capability is supported. After transmission of the SMS, the QoS and bandwidth requirements are restored to their initial settings.

Detailed use case scenario #3 (interworking with other services)

A Service User desires to make a voice call to a (circuit switched) subscriber. The Service User initiates a voice session and the priority information is used for mobile origination and is passed to the circuit-switched domain for the session.

A (circuit-switched) Priority Service subscriber desires to make a voice call to a Service User. The priority information of the originator is passed to the MPS domain and the priority level is available for use, if needed, to complete the voice call.

The same treatment is expected in the U.S., if a legacy PSTN priority call (i.e., from a Government Emergency Telecommunications Service (GETS) subscriber) is calling into the MPS network.

A Service User desires to make a priority international voice call (assuming the Service User is authorized to make an International Emergency Preference Scheme (IEPS) call and there are network operator agreements to support this). The Service User initiates a voice session and the appropriate priority information (e.g., IEPS calling party's category marker) is passed to the circuit-switched domain for the session.

A MPS subscriber desires to make a priority international multimedia session (several assumptions here: that there is a recognized International Emergency Multimedia Service (IEMS) defined by the ITU, that the MPS subscriber is authorized to use the IEMS service, and there are network operator agreements to support this). The MPS subscriber initiates the requested session and the appropriate priority information is passed across the international networks to the terminating network for the session.

Detailed use case scenario #4 (termination of Multimedia Sessions)

If possible, the priority service subscriber will be available for other types of media sessions while awaiting the completion of an initiated session. If the UE can only handle a single session, the user needs to receive an overriding indication of an incoming communication so the user can determine which session with which to continue. The destination could then suspend non-emergency communications to free resources for the incoming emergency communication. If pre-emption were an option, non-emergency communications to the destination could be terminated. Should the destination have "communication forwarding" initiated, the network should then continue to reroute and process the emergency communication with preferential treatment to the new destination.

Detailed use case scenario #5 (Initiation of a Voice over IP (VoIP) session)

As the Service User attempts to initiate a VoIP session, the network recognizes the user as a Priority Service subscriber requesting priority service and allocates network resources to this user first before servicing other non-priority subscribers attempting to initiate sessions.

If network resources are not immediately available, the network places the VoIP session request in queue for the next available resource. The queue is managed by priority level and (within each level) time of entry into the queue.

The network provides feedback to the Service User (either tones or short messages) on the status of the session request.

Priority information associated with the VoIP session is conveyed end-to-end to be used for the mobile termination portion of the session, if applicable.

Detailed use case scenario #6 (Initiation of a Push to talk Over Cellular (POC) session)

As the Service User attempts to initiate a POC session, the network recognizes the user as a Priority Service subscriber requesting priority service and allocates network resources to this user first before servicing other non-priority subscribers attempting to initiate sessions.

If network resources are not immediately available, the network places the POC session request in queue for the next available resource. The queue is managed by priority level and (within each level) time of entry into the queue.

The network provides feedback to the Service User (either tones or short messages) on the status of the session request.

Priority information associated with the POC session is conveyed end-to-end to be used for the Mobile Termination portion of the session, if applicable.

Annex A-1 Phase 2: Use Cases

Overview: Service descriptions from user perspective

MPS for voice

The primary purpose of MPS for Voice is to provide the Service User with priority voice communication sessions in periods of severe network congestion during which normal commercial voice service is degraded. MPS for Voice provides priority for MMTEL voice and MMTEL voice teleconferencing sessions.

In most scenarios during a National Security / Emergency Preparedness (NS/EP) condition, it is expected that MPS for Voice is activated in response to service degradation or when the Service User is aware of network congestion. In limited situations, e.g., when in an area with network congestion, it is possible to proactively invoke MPS for Voice. In all cases, basic connectivity is required in advance of priority service invocation, and special consideration needs to be provided to permit service invocation messages to be delivered during times of congestion.

MPS for DTS

The primary purpose of the MPS for Transport Service (DTS) is to provide the Service User with priority for applications using the default bearer (in the case of 4G), default QoS flow (in the case of 5G) to one or more selected active Packet Data Networks (PDNs)/Data Networks (DNs) in periods of severe network congestion during which normal commercial data service is degraded. It includes access to an enterprise network (e.g., government agency private enterprise network).

In most scenarios during NS/EP condition, it is expected that the DTS is activated in response to service degradation due to network congestion. In limited situations, e.g., when driving into an area with network congestion, it is possible to proactively invoke the DTS. In all cases, basic connectivity is required in advance of priority service invocation, and special consideration needs to be provided to permit service invocation messages to be delivered during times of congestion.

For enterprise access, a Virtual Private Network (VPN) connection is generally established via the originating access network, core network, and the terminating access network to the enterprise network. In this case, the DTS is the means to achieve improved throughput/performance in times of severe network congestion.

For an IoT device, MPS for DTS provides the IoT device with priority for applications using a specific default bearer (in the case of 4G), default QoS flow (in the case of 5G) towards a single specified PDN/DN, and in the case of IoT connectivity with an enterprise, also provides priority for the terminating access network to the enterprise.

MPS for video

The primary purpose of MPS for Video is to provide the Service User with priority video communication sessions in periods of severe network congestion during which normal commercial video service is degraded. MPS for Video provides priority for MMTEL video, streaming video, and MMTEL video teleconferencing sessions.

Priority for Over-The-Top (OTT) video obtained via the use of the DTS is not part of MPS for Video.

In most scenarios during an NS/EP condition, it is expected that MPS for Video is activated in response to service degradation or when the Service User is aware of network congestion. In limited situations, e.g., when in an area with network congestion, it is possible to proactively invoke MPS for Video. In all cases, basic connectivity is required in advance of priority service invocation, and special consideration needs to be provided to permit service invocation messages to be delivered during times of congestion.

MPS for Voice Use Cases

MPS for MMTEL voice during international roaming

In this use case, a UE is configured for MPS with a visited PLMN outside the home country as specified in TS 22.261 [10] clause 6.22.2.2.

A MPS Service User is roaming in a visited PLMN outside the home country. The UE is configured for MPS with the MPS capable visited PLMN outside the home country based on prearranged roaming agreements between the home and visited MPS Service Providers. The Service User turns on the UE for normal international roaming services. As part of the normal attach and registration process, the visited PLMN verifies with the home PLMN that the UE is subscribed for international MPS.

The MPS Service User initiates a normal voice call using the MPS subscribed UE. While network connectivity continues, the call cannot be completed or becomes unacceptable (e.g., due to network congestion). The MPS Service User invokes MPS for the voice call. The MPS invocation is done by the Service User inclusion of an MPS-unique identifier in the MPS capable visited PLMN as part of the request to establish a voice call. Alternatively, the MPS Service User is aware that normal service is degraded (e.g., because of a disaster or emergency event) and immediately invokes MPS for Voice.

The international visited MPS PLMN authenticates and authorises the MPS subscriber use of MPS using subscription information obtained from the home network.

Once the MPS for Voice request is verified and authorized, priority treatment is provided for the media flows.

MPS for MMTEL voice or voice conference call termination to a UE

In this use case, an MPS for an MMTEL voice or voice conference call is initiated in MPS capable originating network A and terminated to a UE served by another network, MPS capable terminating network B (shown in Figure A.1-1). Network A and network B are not necessarily in the same country.

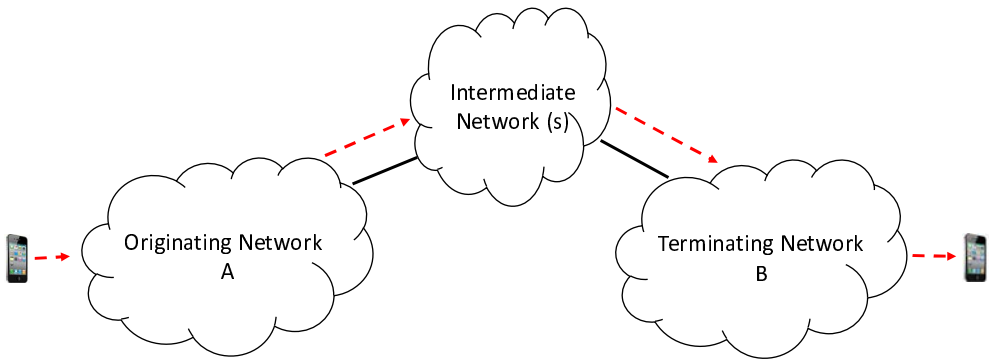

Figure A.1-1 : MPS for MMTEL voice or voice conference call path

For example, the request for MPS is initiated and the MPS subscriber is authenticated and authorized in originating network A. The MPS MMTEL voice or voice conference call/session is then routed with priority towards the terminating network B.

The MPS for MMTEL voice or voice conference call/session may traverse one or more intermediate networks before reaching terminating network B. Intermediate networks may or may not be MPS capable. MPS capable intermediate networks provide priority treatment based on the MPS priority markings of the call. Intermediate networks that are not MPS capable may pass the MPS priority markings transparently based on policy agreements. The set of intermediate networks are not necessarily in the same country.

Terminating network B recognizes the incoming MPS for MMTEL voice or voice conference call/session based on the MPS priority markings and completes the call with priority treatment to the terminating UE based on policy agreements. When the terminating UE needs to be paged by network B, the paging is done with priority.

Priority treatment is provided for the signalling, and once the MPS session is established, priority treatment is also provided for the audio media flows required to support the end-to-end MMTEL call/session.

The MPS session ends when the calling or called party ends the call. MPS is automatically revoked upon UE detachment/deregistration, e.g., power down.

MPS for MMTEL voice invoked from a public UE

A MPS Service User suffers loss of network connectivity due to UE failure during a mission. This may be as simple as UE battery exhaust or could be physical damage to the UE with an MPS subscription. The Service User borrows a public UE that does not have a subscription for MPS. An attempt is made to initiate an MMTEL voice call. Recognizing that normal MMTEL voice service is degraded, the MPS Service User invokes MPS to obtain priority for the MMTEL voice call.

MPS invocation via a public UE is done using a predetermined method (e.g., use of a predetermined access number). The MPS Service Provider authenticates and authorises the MPS subscriber use of MPS. As part of the authentication and authorization process, the Service User provides MPS credentials (e.g., a calling card number, PIN or security token) specifically assigned for the purpose of obtaining MPS from a public UE (i.e., a UE that does not have an MPS subscription).

Priority treatment is provided to the signalling once the request for MPS is identified by the Service Provider. Once MPS is established for the MMTEL voice call, priority treatment is provided for the audio media flow.

NOTE 1: Radio interface priority is not provided for the initial request for invocation of MPS for MMTEL voice. It is provided only after MPS is established for the MMTEL voice call.

NOTE 2: In this use case, MPS is invoked from a UE that does not have an MPS subscription. However, the Service User has a MPS subscription with the Service Provider that is not associated with a UE (i.e., subscription to an MPS feature that allows the Service User to invoke a priority service from any device including from a fixed network access).

MPS MMTEL voice conference call using a public UE

A MPS Service User suffers loss of network connectivity due to UE failure during a mission. This may be as simple as UE battery exhaust or could be physical damage to the UE with an MPS subscription. The Service User borrows a public UE that does not have a subscription for MPS. An attempt is made to make an MMTEL voice conference call. Recognizing that normal MMTEL voice service is degraded, the MPS Service User invokes MPS to obtain priority for the MMTEL voice conference call.

MPS invocation via a public UE is done using a predetermined method (e.g., use of a predetermined access number). The MPS Service Provider authenticates and authorises the MPS subscriber's use of MPS. As part of the authentication and authorization process, the MPS Service User provides MPS credentials (e.g., a calling card number, PIN, or security token) specifically assigned for the purpose of obtaining MPS from a public UE (i.e., a UE that does not have an MPS subscription).

Priority treatment is provided to the signalling once the request for MPS is identified by the Service Provider. Once MPS is established, priority treatment is provided for the audio media flow of that MMTEL voice conference call.

NOTE 1: Radio interface priority is not provided for the initial request for invocation of MPS for MMTEL voice. It is provided only after MPS is established for the MMTEL voice call.

NOTE 2: In this use case, MPS is invoked from a UE that does not have an MPS subscription. However, the Service User has a MPS subscription with the Service Provider that is not associated with a UE (i.e., subscription to an MPS feature that allows the Service User to invoke a priority service from any device including from a fixed network access).

NOTE 3: In this use case, priority is provided to the leg of the MMTEL voice conference associated with the MPS User (i.e., not the entire MMTEL voice conference).

MMTEL voice conference host invocation of MPS for all participants

This use case involves MPS activation for all participants (i.e., participants with MPS subscribed UEs and public UEs) of an MMTEL voice conference call initiated by the conference host (i.e., MPS Service User). The MMTEL voice conference host (i.e., MPS Service User) invokes MPS to request priority for all participants of an MMTEL voice conference call when the MPS Service User is aware that normal voice conference service is degraded (e.g., the normal MMTEL voice conference call cannot be established), or when an ongoing MMTEL voice conference call becomes unacceptable for any conference participant (e.g., due to network congestion), the MPS Service User invokes MPS to upgrade the entire MMTEL voice conference call to obtain priority treatment for all participants.

When the conference host (i.e., MPS Service User) cannot gain access to the MMTEL voice conference server, MPS for MMTEL voice may be used by the host to obtain priority access to the conference server or in the case of a multimedia conference, MPS for DTS as described below may be used to obtain priority data access to the conference server.

The invocation of MPS for all participants of an MMTEL voice conference call is done using a customized feature of the voice conference service (available only to the host) that indicates a request for priority to the MPS capable 3GPP system.

The MPS Service Provider PLMN authenticates and authorizes the MPS subscriber's use of MPS conference invocation to apply to all participants of the MMTEL voice conference call.

Priority treatment is provided for the signalling and once MPS is established for all participants of the MMTEL voice conference call, priority treatment is provided for the audio media flows of all participants on the MMTEL voice conference call.

NOTE 1: The difference between this use case and the basic use case of MPS MMTEL voice conference is that in this case, MPS is invoked by a customized feature of the voice conference service for all participants. This use case assumes that the host was able to join the call, which may require an independent invocation of MPS for a voice call or MPS for DTS, which provided priority only between the host to the conference server.

NOTE 2: When MPS is invoked for all participants on the call, the user priority level is based on the host MPS User, except in cases where an individual participant used MPS to join the conference with a higher user priority level, the higher user priority level is kept.

MPS for DTS use cases

Basic DTS invoked from an MPS subscribed UE

Using an MPS Subscribed UE, a Service User initiates a normal data communication session (e.g., for access to stored data and/or hosted applications), in support of their mission. While network connectivity continues, the data communication becomes unacceptable (e.g., slow or interrupted download). The MPS Service User invokes MPS for DTS to obtain priority for the data communication session. Invocation of MPS is done using a web browser (e.g., use of a predetermined address (i.e., URL) in a web browser) or MPS specialized application on an MPS subscribed UE. Alternatively, the MPS Service User is aware that normal data service is degraded (e.g., because of a disaster or emergency event) and immediately invokes MPS for DTS to initiate a priority data communication session.

The MPS Service Provider authenticates and authorises the MPS subscriber use of MPS. To simplify this process, a custom MPS application may automate this process.

Once the MPS session is established, priority treatment is provided for the media flows or a subset of the media flows. The MPS Service User is able to support different communication applications (e.g., data, streaming video, email, messages) over the MPS for DTS session.

When the need for priority communications ends, the MPS Service User explicitly revokes MPS. MPS is automatically revoked upon UE detachment/deregistration, e.g., power down.

DTS invocation from a MPS subscribed UE for VPN access to an enterprise network

The MPS Service User needs to connect to an MPS capable enterprise network (e.g., a private corporate network) to access information critical to the mission (e.g., to download data and/or access enterprise applications such as email, text/chat/presence, voice and video). Using normal data service, the MPS Service User attempts to establish a Virtual Private Network (VPN) connection to its MPS capable enterprise network but fails (e.g., because normal data service is degraded as a result of a disaster or emergency event). The MPS Service User then retries the connection, but first invokes the DTS to have a higher probability of establishment.

As an alternative, initial access to the MPS capable enterprise network may succeed but future conditions (e.g., degradation of data service) may render the connectivity ineffective. In which case, the MPS Service User invokes DTS. The MPS Service User may invoke the DTS without first releasing the VPN. It is not necessary to re-establish the VPN after activating the DTS.

The MPS Service Provider PLMN authenticates and authorizes the MPS subscriber's MPS use. Invocation of the DTS is done either using a web browser (e.g., use of a predetermined address (i.e., URL) in a web browser) or using a user-selectable option provided as part of the VPN client in the UE with an MPS subscription.

Once the DTS session is established, the MPS Service User is able to use its normal process to establish the VPN connection to its MPS capable enterprise network.

When the need for priority communications ends, the MPS Service User explicitly revokes MPS. MPS is automatically revoked upon UE detachment/deregistration, e.g., power down.

NOTE: The difference between this use case and the basic DTS use case is that this case adds priority in the network segment between the 3GPP system and the enterprise network.

MPS capable enterprise network activation of DTS for MPS subscribed UEs

This use case involves an MPS capable enterprise network (e.g., government agency network) having a subscription arrangement with a MPS Service Provider PLMN identifying the enterprise network as an entity that can activate DTS for MPS subscribed UEs.

The MPS capable enterprise network (e.g., government agency network) needs to upgrade a data session with priority when there is network congestion (e.g., because normal data service is degraded as a result of a disaster or emergency event). The MPS capable enterprise network requests the MPS Service Provider PLMN to invoke DTS for a data session associated with a UE.

This use case also includes the case where an MPS capable enterprise network (e.g., government agency network) needs to upgrade a group of data sessions (e.g., all users in an OTT web meeting). The MPS capable enterprise network requests the MPS Service Provider PLMN to invoke DTS for a group of data sessions.

DTS invocation done by the MPS capable enterprise network involves prearrangement and configuration (i.e., subscription arrangement identifying the enterprise network authorization for DTS) with the MPS Service Provider PLMN.

NOTE: The key differences between this use case and the other DTS use cases is that the DTS Invocation is from an MPS capable enterprise network instead of from a UE.

Once DTS is established for a data session or group of data sessions, the MPS capable enterprise network is able to support its normal data communication services over the DTS connection (e.g., OTT web meeting).

When the need for DTS ends, the enterprise network explicitly revokes the DTS.

The MPS Service Provider PLMN should automatically revoke the DTS when the connections under control of the DTS are released (e.g., when the enterprise network closes all the connections but fails to explicitly release the DTS).

DTS invoked during international roaming

A MPS Service User is roaming in a visited PLMN outside the home country. The UE is configured for MPS with the MPS capable visited PLMN outside the home country based on prearranged roaming agreements between the home and visited MPS Service Providers. The Service User turns on the UE for normal international roaming services. As part of the normal attach and registration process, via interactions with the home PLMN, the visited PLMN verifies that the UE's subscription entitles it to invoke international MPS. It may provide an indication to the UE that this verification has occurred.

The MPS Service User initiates a normal data communication session (e.g., for access to stored data and/or hosted applications) using an MPS subscribed UE. While network connectivity continues, the data communication becomes unacceptable (e.g., slow or interrupted download). The MPS Service User invokes MPS for DTS to obtain priority for the data communication session. Invocation of MPS is done using a web browser (e.g., use of a predetermined address (i.e., URL) in a web browser) or MPS specialized application on an MPS subscribed UE. Alternatively, the MPS Service User is aware that normal data service is degraded (e.g., because of a disaster or emergency event) and immediately invokes MPS for DTS to initiate a priority data communication session.

The international visited MPS Service Provider authenticates and authorises the MPS subscriber use of MPS, making use of subscription information obtained from the home PLMN at the time of registration. To simplify this process, a custom MPS application may automate this process.

Once the MPS session is established, priority treatment is provided for the media flows or a subset of the media flows. The MPS Service User is able to support different communication applications (e.g., data, streaming video, email, messages) over the MPS for DTS session.

When the need for priority communications ends, the MPS Service User explicitly revokes MPS. MPS is automatically revoked upon UE detachment/deregistration, e.g., power down.

DTS invoked from a public UE

A MPS Service User suffers loss of network connectivity due to UE failure during a mission. This may be as simple as UE battery exhaust or could be physical damage to the UE with an MPS subscription. The Service User borrows a public UE that does not have a subscription for MPS. An attempt is made to initiate a data communication session (e.g., download some data and/or images using the available browser). Recognizing that normal data service is degraded, the MPS Service User invokes MPS for DTS to obtain priority for the data communication session.

Invocation via a public UE is done using a browser (e.g., use of a predetermined address (i.e., URL) in a web browser). The MPS Service Provider authenticates and authorises the MPS subscriber use of MPS. As part of the authentication and authorization process, the Service User provides MPS credentials (e.g., a PIN or security token) specifically assigned for the purpose of obtaining MPS from a public UE (i.e., a UE that does not have an MPS subscription).

Once the MPS session is established, priority treatment is provided for the media flows or a subset of the media flows. The MPS Service User is able to support different communication applications (e.g., data, streaming video, email, messages) over the MPS for DTS session.

When the need for priority communications ends, the MPS Service User explicitly revokes MPS. MPS is automatically revoked upon UE detachment/deregistration, e.g., power down.

NOTE: The difference between this use case and the basic DTS use case is that in this case, MPS is invoked from a UE that does not have an MPS subscription. However, the Service User has a MPS subscription with the Service Provider that is not associated with a UE (i.e., subscription to an MPS feature that allows the Service User to invoke a priority service from any device including from a fixed network access).

DTS invoked from an IoT device

An IoT device (e.g., industrial control monitor) with a subscription for MPS needs to send data to a remote server (e.g., Government Agency server) when normal data service is degraded. The IoT device invokes MPS for DTS to obtain priority for the data communication session.

An MPS specialized application on the MPS subscribed IoT device is responsible for determining whether or not to invoke MPS for DTS in support of the data communication needs. The MPS specialized application allows invocation/revocation of the DTS through machine interactions that may not directly involve a human Service User.

The MPS Service Provider authenticates and authorises the IoT device use of MPS.

Once the MPS session is established, priority treatment is provided for the media flows or a subset of the media flows. The IoT device is able to support different communication applications (e.g., data and messages) over the MPS for DTS session.

When the need for priority communications ends, the IoT device (i.e., the MPS specialized application on the IoT device) explicitly revokes MPS. MPS is automatically revoked upon UE detachment/deregistration, e.g., power down.

MPS capable enterprise network activation of DTS for MPS subscribed IoT devices

This use case involves an MPS capable enterprise network (e.g., government agency network) having a subscription arrangement with a MPS Service Provider identifying the enterprise network as an entity that can activate DTS for MPS subscribed IoT devices whose subscriptions permit MPS invocation via a specific enterprise customer.

The MPS capable enterprise network (e.g., government agency network) needs to upgrade a data session with priority when there is network congestion (e.g., because normal data service is degraded as a result of a disaster or emergency event). For example, an IoT application server (e.g., government IoT management or application server) in the MPS capable enterprise network needs to send data or pull data from a remote IoT device when normal data service is degraded. The MPS capable enterprise network requests the MPS Service Provider PLMN to invoke DTS for a data session associated with the IoT device.

This use case also includes the case where an MPS capable enterprise network (e.g., government agency network) needs to upgrade a group of data sessions (e.g., an OTT IoT application for a group of IoT devices). The MPS capable enterprise network requests the MPS Service Provider to invoke DTS for a group of data sessions.

DTS invocation done by the MPS capable enterprise network involves prearrangement and configuration (i.e., subscription arrangement identifying the Enterprise Network authorization for remote activation of DTS in IoT devices) within the MPS Service Provider PLMN. For example, a MPS specialized application hosted in the MPS capable enterprise network (e.g., IoT application server) may be responsible for determining whether or not to invoke MPS for DTS. The MPS specialized application allows invocation/revocation of the DTS through machine interactions that may not directly involve a human Service User.

NOTE: The key differences between this use case and the other IoT use case in subclause 6.6 is that the DTS invocation is from an MPS capable enterprise network instead of from the IoT device.

Once DTS is established for a data session or group of data sessions, the MPS capable enterprise network is able to support its normal data communication services over the DTS connection (e.g., OTT IoT application).

When the need for DTS ends, the enterprise network explicitly revokes the DTS.

The MPS Service Provider PLMN should automatically revoke the DTS when the connections under control of the DTS are released (e.g., when the enterprise network closes all the connections but fails to explicitly release the DTS).

MPS for DTS QoS and media encryption modifications

This use case describes the need for a Service User to communicate Quality of Service (QoS) related needs to a MPS capable 3GPP system for an established MPS for DTS session. As described in other use cases, once a MPS for DTS session has been successfully established, different communication applications (e.g., media types) can be supported

over the MPS for DTS session. For example, voice, video, data, text messages (e.g., SMS). In addition, in certain cases the Service User would need to encrypt the media supported over the MPS for DTS session (e.g., secure voice).

A Service User (or server with MPS subscription) was able to successfully establish a MPS for DTS session. The Service User was then able to conduct several data transactions over the active DTS session (e.g., email, data download etc). The Service User now needs to support a voice or video communication over the DTS session. The Service User indicates to the MPS capable 3GPP system the Quality of Service (QoS) needs or modifications needed for the new media type for the active DTS session. The MPS 3GPP system makes the needed QoS modifications to support the new media type (i.e., voice or video). The Service User is now able to support the voice or video communication over the active DTS session.

After a MPS for DTS session was successfully established, the Service User (or server with MPS subscription) now needs to support a secure communication (i.e., encryption of the media flows) over the DTS session. The Service User indicates to the MPS capable 3GPP system the Quality of Service (QoS) needs or modifications needed for the new media encryption for the active DTS session. The MPS 3GPP system makes the needed QoS modifications to support the new media encryption. The Service User is now able to support the secure communication (i.e., media encryption) over the active DTS session.

MPS for video use cases

MPS for MMTEL video call invoked from a MPS subscribed UE

The MPS Service User initiates a normal MMTEL video call using the MPS subscribed UE. While network connectivity continues, the MMTel video call cannot be established, or an established MMTEL video call becomes unacceptable (e.g., due to network congestion). The MPS Service User invokes MPS to obtain priority for the MMTEL video call.

In the case where the MMTEL video call cannot be established, the MPS invocation is done by the Service User inclusion of an MPS-unique identifier as part of the request to establish a video call (e.g., a MPS feature code). Alternatively, the MPS Service User is aware that normal video service is degraded (e.g., because of a disaster or emergency event) and immediately invokes MPS to obtain priority for the MMTEL video call.

In the case where the MMTEL video call is already established but becomes unacceptable, the invocation by the MPS Service User to upgrade the MMTEL video call to MPS is done using a using a specialized MPS application on the UE (i.e., as an alternative to releasing and retrying the call which may fail).

The MPS capable PLMN authenticates and authorises the MPS subscriber use of MPS for a MMTEL video call.

Priority treatment is provided for the signalling flow and once the MPS session is established, priority treatment is provided for the audio and video media flows of that MMTEL video call.

MPS for MMTEL video invoked from a public UE

A MPS Service User suffers loss of network connectivity due to UE failure during a mission. This may be as simple as UE battery exhaust or could be physical damage to the UE with an MPS subscription. The Service User borrows a public UE that does not have a subscription for MPS. An attempt is made to initiate an MMTEL video call. Recognizing that normal MMTEL video service is degraded, the MPS Service User invokes MPS to obtain priority for the MMTEL video call.

MPS invocation via a Public UE is done using a predetermined method (e.g., use of a predetermined access number). The MPS Service Provider authenticates and authorises the MPS subscriber use of MPS. As part of the authentication and authorization process, the Service User provides MPS credentials (e.g., a calling card number or PIN or security token) specifically assigned for the purpose of obtaining MPS from a public UE (i.e., a UE that does not have an MPS subscription).

Priority treatment is provided to the signalling and once MPS is established for the MMTEL video call, priority treatment is provided for the audio and video media flows.

NOTE: The difference between this use case and the basic MPS MMTEL video use case is that in this case, MPS is invoked from a UE that does not have an MPS subscription. However, the Service User has a MPS subscription with the Service Provider that is not associated with a UE (i.e., subscription to an MPS feature that allows the Service User to invoke a priority service from any device including from a fixed network access).

MPS for MMTEL video call during international roaming

In this use case, a UE is configured for MPS with a visited PLMN outside the home country as specified in TS 22.261 [10] clause 6.22.2.2.

A MPS Service User is roaming in a visited PLMN outside the home country. The UE is configured for MPS with the MPS capable visited PLMN outside the home country based on prearranged roaming agreements between the home and visited MPS Service Providers. The Service User turns on the UE for normal international roaming services. As part of the normal attach / registration process, the visited PLMN verifies with the home PLMN that the UE is subscribed for international MPS. As part of subscription for international MPS, the UE is provided roaming configurations to preferred PLMNs which support MPS.

The MPS Service User initiates a normal MMTEL video call using the MPS subscribed UE. While network connectivity continues, the MMTEL video call cannot be established, or an established MMTEL video call becomes unacceptable (e.g., due to network congestion). The MPS Service User invokes MPS to obtain priority for the MMTEL video call.

In the case where the MMTEL video call cannot be established, the MPS invocation is done by the Service User inclusion of an MPS-unique identifier as part of the request to establish a video call (e.g., a MPS feature code). Alternatively, the MPS Service User is aware that normal video service is degraded (e.g., because of a disaster or emergency event) and immediately invokes MPS to obtain priority for the MMTEL video call.

In the case where the MMTEL video call is already established but becomes unacceptable, the invocation by the MPS Service User to upgrade the MMTEL video call to MPS is done using a using a specialized MPS application on the UE (i.e., as an alternative to releasing and retrying the call which may fail).

The visited MPS capable PLMN authenticates and authorises the MPS subscriber use of MPS for an MMTEL video call using subscription information obtained from the home network.

Priority treatment is provided for the signalling and once the MPS session is established, priority treatment is provided for the audio and video media flows of that MMTEL video session.

NOTE: This video use case is analogous to the MPS Voice during international roaming use case.

MPS MMTel video conference call using a MPS subscribed UE

The MPS Service User initiates a normal MMTEL video conference call using the MPS subscribed UE. While network connectivity continues, the MMTEL video conference call cannot be established, or an established MMTEL video conference call becomes unacceptable (e.g., due to network congestion). The MPS Service User invokes MPS to obtain priority for the MMTEL video conference call.

In the case where the MMTEL video conference call cannot be established, the MPS invocation is done by the Service User inclusion of an MPS-unique identifier as part of the request to establish an MMTEL video conference call (e.g., a MPS feature code). Alternatively, the MPS Service User is aware that normal MMTEL video service is degraded (e.g., because of a disaster or emergency event) and immediately invokes MPS to obtain priority for the MMTEL video conference call.

In the case where the MMTEL video conference call is already established but becomes unacceptable, the invocation by the MPS Service User to upgrade the MMTEL video conference call to MPS is done using a specialized MPS application on the UE (i.e., as an alternative to releasing and retrying the call which may fail).

The MPS capable PLMN authenticates and authorises the MPS subscriber use of MPS for an MMTEL video conference call.

Priority treatment is provided for the signalling and once the MPS session is established, priority treatment is provided for the audio and video media flows of that MMTEL video conference call.

NOTE: In this use case priority is provided to the leg of the MMTEL video conference associated with the MPS User (i.e., not the entire MMTEL video conference).

MPS MMTEL video conference call using a public UE

A MPS Service User suffers loss of network connectivity due to UE failure during a mission. This may be as simple as UE battery exhaust or could be physical damage to the UE with an MPS subscription. The Service User borrows a public UE that does not have a subscription for MPS. An attempt is made to make an MMTEL video conference call. Recognizing that normal MMTEL video service is degraded, the MPS Service User invokes MPS to obtain priority for the MMTEL video conference call.

MPS invocation via a Public UE is done using a predetermined method (e.g., use of a predetermined access number). The MPS Service Provider authenticates and authorises the MPS subscriber use of MPS. As part of the authentication and authorization process, the MPS Service User provides MPS credentials (e.g., a calling card number or PIN or security token) specifically assigned for the purpose of obtaining MPS from a public UE (i.e., a UE that does not have an MPS subscription).

Priority treatment is provided for the signalling and once the MPS session is established, priority treatment is provided for the audio and video media flows of that MMTEL video conference call.

NOTE 1: The difference between this use case and the basic use case on MPS MMTEL video conference is that in this case, MPS is invoked from a UE that does not have an MPS subscription. However, the Service User has a MPS subscription with the Service Provider that is not associated with a UE (i.e., subscription to an MPS feature that allows the Service User to invoke a priority service from any device including from a fixed network access).

NOTE 2: In this use case priority is provided to the leg of the MMTEL video conference associated with the MPS User (i.e., not the entire MMTEL video conference).

MMTEL video conference host invocation of MPS for all participants

A MPS Service User is the host (i.e., conference organizer) of an MMTEL video conference call. While connectivity continues, video quality becomes unacceptable. The MPS Service User invokes MPS (i.e., via the video conference server application) to upgrade the entire MMTEL video conference call to obtain priority treatment for all participants (i.e., participants with MPS subscribed UEs and public UEs) on the video conference call. In the case that the meeting host cannot establish the MMTEL video conference call, MPS for an MMTEL video call may be invoked to provide priority service for the host to the conference server. In such a case, upon establishing connectivity with the conference server, the host may elect to pre-emptively request MPS for all participants assuming that others will experience similar service degradations, rather than to wait until problems with the MMTEL conference call are observed.

The invocation of MPS for all participants on the MMTEL video conference call is done using a customized feature of the video conference service (available only to the host) that indicates a request for priority to the MPS capable 3GPP system.

The MPS Service Provider PLMN authenticates and authorizes the MPS subscriber's use of MPS for all participants of the MMTEL video conference call.

Priority treatment is provided for the signalling and once MPS is established for all participants of the MMTEL video conference call, priority treatment is provided for the audio and video media flows of all participants on the MMTEL video conference call.

NOTE 1: The difference between this use case and the basic use case of MPS MMTEL video conference is that in this case, MPS is invoked by a customized feature of the video conference service for all participants. This use case assumes that the host was able to join the call, which may require an independent invocation of MPS for a video call, which provided priority only between the host to the conference server.

NOTE 2: When MPS is invoked for all participants on the call, the user priority level is based on the host MPS User, except in cases where the individual participants have a higher user priority level, the higher user priority level is kept.

MPS for MMTEL video conference during international roaming

In this use case, a UE is configured for MPS with a visited PLMN outside the home country as specified in TS 22.261 [10] clause 6.22.2.2.

A MPS Service User is roaming in a visited PLMN outside the home country. The UE is configured for MPS with the MPS capable visited PLMN outside the home country based on prearranged roaming agreements between the home and visited MPS Service Providers. The Service User turns on the UE for normal international roaming services. As part of the normal attach / registration process, the visited PLMN verifies with the home PLMN that the UE is subscribed for international MPS. As part of subscription for international MPS, the UE is provided roaming configurations to preferred PLMNs which support MPS.

The MPS Service User initiates a normal MMTEL video conference call using the MPS subscribed UE. While network connectivity continues, the MMTEL video conference call cannot be established, or an established video conference call becomes unacceptable (e.g., due to network congestion). The MPS Service User invokes MPS to obtain priority for the MMTEL video conference call.

In the case where the MMTEL video conference call cannot be established, the MPS invocation is done by the Service User inclusion of an MPS-unique identifier as part of the request to establish an MMTEL video conference call (e.g., a MPS feature code). Alternatively, the MPS Service User is aware that normal operator video service is degraded (e.g., because of a disaster or emergency event) and immediately invokes MPS to obtain priority for the MMTEL video conference call.

In the case where the MMTEL video conference call is already established but becomes unacceptable, the invocation by the MPS Service User to upgrade the MMTEL video conference call to MPS is done using a using a specialized MPS application on the UE (i.e., as an alternative to releasing and retrying the call which may fail).

The visited MPS capable PLMN authenticates and authorises the MPS subscriber use of MPS for an MMTEL video conference call using subscription information obtained from the home network.

Priority treatment is provided for the signalling and once the MPS session is established, priority treatment is provided for the audio and video media flows of that MMTEL video conference session.

NOTE: This video use case is analogous to the MPS Voice during international roaming use case.

MPS for MMTEL video or video conference termination to a UE

Description

In this use case, an MPS for an MMTEL video or video conference call is initiated in MPS capable originating network A and terminated to a UE served by another network, MPS capable terminating network B (shown in Figure A.1-2). Network A and network B are not necessarily in the same country.

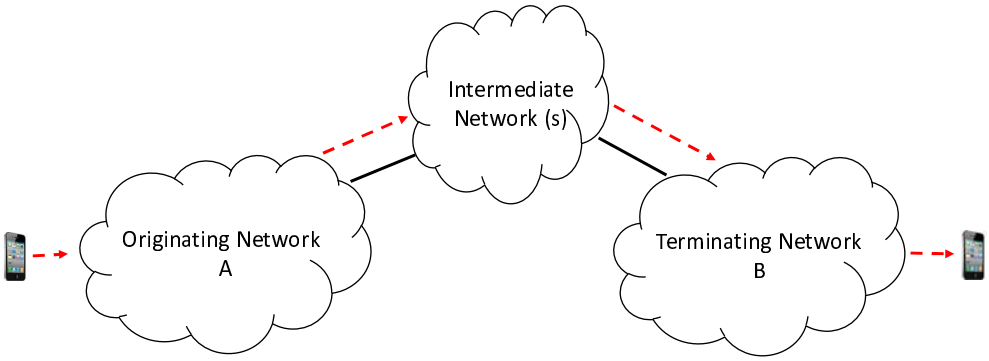

Figure A.1-2: MPS for MMTel video or video conference call path

For example, the request for MPS is initiated and the MPS subscriber is authenticated and authorized in originating network A. The MPS MMTEL video or video conference call/session is then routed with priority towards the terminating network B.

The MPS for MMTEL video or video conference call/session may traverse one or more intermediate networks before reaching terminating network B. Intermediate networks may or may not be MPS capable. MPS capable intermediate networks provide priority treatment based on the MPS priority markings of the call. Intermediate networks that are not MPS capable may pass the MPS priority markings transparently based on policy agreements. The set of intermediate networks are not necessarily in the same country.

Terminating network B recognizes the incoming MPS for MMTEL video or video conference call/session based on the MPS priority markings and completes the call with priority treatment to the terminating UE based on policy agreements. When the terminating UE needs to be paged by network B, the paging is done with priority.

Priority treatment is provided for the signalling, and once the MPS session is established, priority treatment is also provided for the audio and video media flows required to support the end-to-end MMTEL call/session.

The MPS session ends when the calling or called party ends the call. MPS is automatically revoked upon UE detachment/deregistration, e.g., power down.

MPS for streaming video communications

Description

MPS Service Users may need to use MPS for streaming video communications to execute their mission objectives. This encompasses both a pull scenario (e.g., view video content from a web server, or view video from a remote camera) and a push scenario (e.g., sending video content towards a web server, or a camera sending video into the network).

For example, an MPS Service User initiates a normal streaming video session. While network connectivity continues, the streaming video session cannot be established, or an established streaming video session becomes unacceptable (e.g., due to network congestion). The MPS Service User invokes MPS to obtain priority for the streaming video session. This invocation is supported on both MPS subscribed UEs and public UEs.

Invocation of MPS for a streaming video communication is done as described in clause 6 for the DTS. In general, MPS for streaming video is based on the use of DTS as described in the DTS use cases (i.e., the streaming video is supported as an OTT service by DTS). Therefore, individual streaming video use cases are not described as they are covered by the corresponding DTS use case described above as summarized below.

Streaming video use case	Corresponding DTS use case
MPS for streaming video invoked from an MPS subscribed UE	Basic DTS invoked from an MPS subscribed UE
MPS for streaming video towards an Enterprise	DTS invocation from a MPS subscribed UE for VPN access to an enterprise network
MPS capable enterprise network activation of MPS streaming video for an MPS subscribed UE	MPS capable enterprise network activation of DTS for MPS subscribed UEs
MPS for streaming video invoked during international roaming	DTS invoked during international roaming
MPS for streaming video invoked from a public UE	DTS invoked from a public UE
MPS for streaming video invoked from an IoT device	DTS invoked from an IoT device
MPS capable enterprise network activation of MPS for streaming video from an MPS subscribed IoT device	MPS capable enterprise network activation of DTS for MPS subscribed IoT devices

Security considerations

Trust and assertion of authorized MPS priority markings

In this use case, MPS for an MMTEL voice or video call is initiated in MPS capable originating network A and terminated to a UE served by another network, MPS capable terminating network B (shown in Figure A.1-3). Network A and network B are not necessarily in the same country. Once the request for MPS is authenticated and authorized by originating network A, the MPS call is provided priority treatment based on the MPS priority markings of the call.

The MPS call may traverse one or more intermediate networks before reaching terminating network B. Intermediate networks may or may not be MPS capable. MPS capable intermediate networks provide priority treatment based on the MPS priority markings of the call. Intermediate networks that are not MPS capable may pass the MPS priority markings transparently based on policy agreements. The set of intermediate networks are not necessarily in the same country.

A network (e.g., an intermediate network or terminating network B) receiving a call with MPS priority markings from another network may not trust the validity of the MPS priority markings to admit the call with the MPS priority markings. For example, it is possible that the MPS priority markings could have been spoofed or modified by unauthorized entities along the call path between the originating network and the receiving network.

This use case describes a mechanism for an originating network (e.g., network A) to send a trust assertion for the MPS priority markings and a receiving network (e.g., terminating network B) to verify the assertion to determine whether it can be trusted and the call admitted with the priority markings.

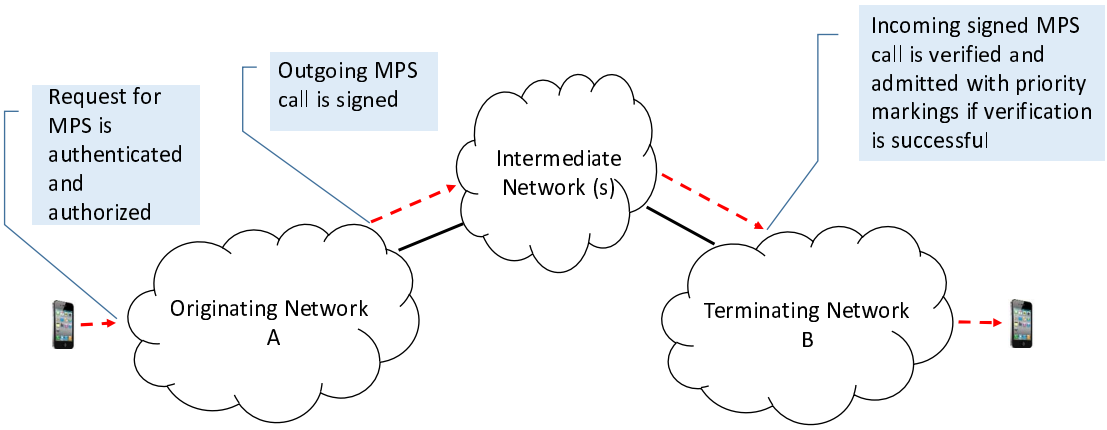

Figure A.1-3: Trust of MPS priority markings

In this use case, originating network A sends an assertion that the MPS markings of the outgoing MPS call is authorized (e.g., using a cryptographic token) and then routes the call towards terminating network B. For example, originating network A could use the Personal Assertion Token (PASSporT) extension defined in RFC 8443 [11] to cryptographically sign the Session Initiation Protocol Resource Priority Header (SIP RPH). By including the signed PASSPorT token for the SIP RPH, originating network A is asserting that the call is an MPS call that has been authenticated and authorized (i.e., the MPS priority markings can be trusted).

An intermediate network receiving the incoming MPS call with a signed token for the MPS priority markings (e.g., PASSPorT token for the SIP RPH) may verify the token to determine whether to trust the MPS priority markings and provide priority treatment to the call based on policy agreements.

Upon receiving the incoming MPS call with a signed token for the MPS priority markings (e.g., PASSPorT token for the SIP RPH), terminating network B verifies the token. If the verification is successful, it means that the MPS priority markings can be trusted and the call is admitted with the MPS priority markings and provided priority treatment based on policy agreements. If the token verification fails, terminating network B may decide based on local policy to admit the call without the MPS priority markings (i.e., treat the call as an ordinary call).

Terminating network B may provide the called UE with information indicating that the MPS call was verified as a priority call. For example based on local policy, the called UE may be provided with display information that the call is a verified priority call.

Annex B:
Change history

Change history											
TSG SA#	**SA Doc.**	**SA1 Doc**	**Spec**	**CR**	**Rev**	**Rel**	**Cat**	**Subject/Comment**	**Old**	**New**	**Work Item**
			ab.cde					Initial draft presented at SA1#23	0.0.0	0.1.0	PRIOR-MM
		S1-040592	ab.cde					Input version 0.2.0 to SA1 #25	0.1.0	0.2.0	PRIOR-MM
		S1-040698	22.953					Output version 0.3.0 from SA1 #25	0.2.0	0.3.0	PRIOR-MM
		S1-050096	22.953					Output version 0.4.0 from SA1 #26	0.3.0	0.4.0	PRIOR-MM
		S1-050361	22.953					Output version 0.5.0 from SA1 #27	0.4.0	0.5.0	PRIOR-MM
		S1-050638	22.953					Output version 0.6.0 from SA1 #28	0.5.0	0.6.0	PRIOR-MM
		S1-051020	22.953					Output version 0.7.0 from SA1 #29	0.6.0	0.7.0	PRIOR-MM
		S1-060011	22.953					Output version 0.8.0 from SA1 #30	0.7.0	0.8.0	PRIOR-MM
		S1-060025	22.953					Raised to version 1.0.0 for presentation to SA #31	0.8.0	1.0.0	PRIOR-MM
SP-32	SP-060328	S1-060517	22.953	-	-	Rel-7	-	Raised to version 2.0.0 for presentation to SA for approval	1.0.0	2.0.0	PRIOR-MM
SP-32	SP-060328	S1-060517	22.953	-	-	Rel-7	-	Approved at SA #32	2.0.0	7.0.0	PRIOR-MM
SP-33	SP-060475	S1-060884	22.953	0001	-	Rel-7	F	CR to 22.953 on clarification of terminology	7.0.0	7.1.0	PRIOR-MM
SP-33	SP-060475	S1-060959	22.953	0002	-	Rel-7	F	CR to 22.953 on clarification of conclusion	7.0.0	7.1.0	PRIOR-MM
SP-42	-	-	22.953			Rel-8		Updated from Rel-7 to Rel-8	7.0.0	8.0.0	
SP-46	-	-	-	-	-	-	-	Updated to Rel-9 by MCC	8.0.0	9.0.0	
2011-03	-	-	-	-	-	-	-	Update to Rel-10 version (MCC)	9.0.0	10.0.0	
2012-09	-	-	-	-	-	-	-	Updated to Rel-11 by MCC	10.0.0	11.0.0	
2014-10								Updated to Rel-12 by MCC	11.0.0	12.0.0	
2015-12	-	-	-	-	-	-	-	Updated to Rel-13 by MCC	12.0.0	13.0.0	
2017-03	-	-	-	-	-	-	-	Updated to Rel-14 by MCC	13.0.0	14.0.0	
2018-06	-	-	-	-	-	-	-	Updated to Rel-15 by MCC	14.0.0	15.0.0	

Change history							
Date	**Meeting**	**TDoc**	**CR**	**Rev**	**Cat**	**Subject/Comment**	**New version**
2019-12	SA#86	-	-	-	-	Comment: version 16.0.0 identical to v.15.0.0. Created because of Rel-17 CR 0003r1 on a Rel-15 spec.	16.0.0
2019-12	SA#86	SP-191018	0003	1	B	TR 22.953 Updates based on TR 22.854 MPS Phase 2 Feasibility Study	17.0.0

History

Document history		
V17.0.0	May 2022	Publication