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Multimedia Priority Service (MMPS) for MMD-based Networks – Stage 1 Requirements

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Foreword

This standard was prepared by Technical Specification Group S of the Third Generation Partnership Project 2 (3GPP2).

1 Introduction

Communication during times of disaster/crisis is critical to ensure that needed resources are deployed to mitigate the effects of a disaster. Unfortunately, times of disaster are when network resources are strained and it becomes difficult to access the public network. During times such as this, it is important to provide capabilities in the network to allow a certain class of subscribers access to the scarce network resources. This would enable the public emergency and safety agencies to appropriately respond to the situation at hand. Wireless Priority Service for CDMA-based networks has already been defined by TIA [1]. It is important to ensure that priority service continue to be offered as networks evolve. Authorized users that respond to disaster or crisis situations should have priority access to network communication resources in MMD-based Networks. Multimedia Priority Service (MMPS) will provide the needed priority capabilities for voice, data, video, messaging and multimedia services to these authorized users. MMPS allows qualified and authorized users to obtain access to resources on a priority basis before all other PLMN users, subject to national/regional regulations. This document defines the requirements to enable MMPS in MMD-based Networks.

1.1 Normative References

[1] TIA-917. Wireless Priority Service. 2004.

1.2 Definitions and Abbreviations

1. MMD – Multimedia Domain
2. MMPS Service User – An individual (or organization) who (or which) has received a user priority level assignment from a regional authority (i.e., government agency authorized to issue priority assignments) and has a subscription to a wireless service with a Commercial Mobile Radio Service (CMRS) provider that provides MMPS.
3. PSTN – Public Service Telephone Network
4. QoS – Quality of Service
5. SC – Service Code
6. VoIP – Voice over Internet Protocol

2 General Description

Governmental, military, civil authorities and other essential users of public telecommunications networks have a need for essential telecommunication services including voice, data, video, and multimedia in crisis and disaster situations. These telecommunication services will be needed at the same time that access to the public networks might be restricted due to damage, congestion, or faults. This situation warrants mechanisms that provide secure and manageable ways to identify authorized users, and provide priority communications from access and session set up, through session completion. Priority is established by the session originator, and will only apply to terminating parties when the originating party has invoked priority. Any network mechanisms defined should provide priority treatment to authorized users. In addition to priority treatment for radio system access, priority treatment includes, but is not

limited to, high probability of session completion, quality of service assurances, and exemption from restrictive network management controls. While mechanisms have been defined to provide priority service in traditional circuit-switched voice networks, it is crucial that priority services continue to be provided in MMD-based Networks.

The need for mechanisms to provide MMPS is global in scope. Several industry bodies, of similar scope as 3GPP2, are currently involved in defining mechanisms in support of Priority Service. The scope of this requirements document is to define the requirements for MMPS for MMD-based Networks. The focus of this MMPS effort will be on session based services using MMD incorporating packet data and IP transport.

3 High Level System Requirements

3.1 General

SYS001 - MMPS Service Users shall be capable of using any service to which they have subscribed and authorized.

Subscription to MMPS should not preclude a subscriber from accessing services available to non-MMPS subscribers.

SYS002 – An MMPS Service User shall be capable of using any terminal supporting MMD to initiate MMPS.

MMPS Service Users should not have to use special terminals or be assigned special identities/phone numbers to invoke MMPS. It is expected that the terminal will have mechanisms (e.g., feature codes) to identify to the network that an MMPS session is being attempted.

SYS003 – An MMPS Service User shall be capable of invoking priority services for all applications provisioned to support the MMPS subscriber. These include, but are not limited to voice calls, data, video conferencing, text messaging, and email.

An MMPS Service User should be able to invoke any service offered by the network and have their traffic get priority services at the priority level assigned to the MMPS subscriber.

SYS004 – An MMPS Service User shall be capable of invoking more than one priority session simultaneously if this capability is offered by the network. For example, making a voice call and sending video simultaneously with both sessions receiving the same priority.

SYS005 – An MMPS session shall be exempt from restrictive network management controls. The network shall support policy controls to enable exemption of network restrictions for MMPS Service Users.

Restrictive network management control such as call gapping in overloaded networks shall not be used for MMPS sessions unless those controls are critical for network survivability.

SYS006 – Subject to regional/national regulatory policy, a Public Wireless Network offering MMPS should have the capability to retain public access as a fundamental function. It shall be possible to limit MMPS traffic volume, so that it does not exceed a specified percentage of any concentrated network resource usage (such as base station capacity).

SYS007 -,A Public Wireless Network offering MMPS shall assign MMPS users the highest priority level within their network with the exception of network management users, unless precluded by national/regional policies.

3.2 MMPS Session Origination

PSO001 – A session shall receive priority radio treatment (priority access to voice or traffic channels) on the originating network when the session is originated by an MMPS Service User. The radio access network shall apply the priority level assigned to the MMPS subscriber.

3.3 MMPS Session Establishment

PST001 – A session shall receive priority treatment (priority access to voice or traffic channels) in the terminating mobile network, when the session is originated by an MMPS Service User. The terminating radio access network shall apply the priority level assigned to the originating MMPS subscriber

Since MMPS is invoked by an explicit user request, it can only be initiated by the originator of a service. It only applies to terminations when the originator is an MMPS Service User. The priority of the terminating party is irrelevant.

3.4 MMPS Session Progression

PCP001 – An MMPS Service User shall receive priority treatment as the user's session progresses through the mobile network(s). Under congestion conditions, an authorized MMPS session shall be given priority over normal sessions in the originating mobile networks, and in the terminating mobile network. In case the MMPS session traverses or terminates in other networks (e.g., the PSTN), the network shall support the capability to indicate to the other network that this is an MMPS session. MMPS sessions should not be preempted.

3.5 Priority Radio Resource Queuing

PRP001 – When an MMPS Service User encounters a "no resource available" condition in the session origination, the MMPS session request shall be:

- Queued in the cell serving the calling party,
- Processed for the next available radio resources in that cell in accordance with the MMPS Service User's priority level and session initiation time.

PRP002 – When an MMPS Service User encounters a "no resource available" condition in the session path in the terminating mobile network at session establishment, the MMPS session shall be:

- Queued in the cell serving the called party.
- Processed for the next available radio resources in that cell in accordance with the MMPS Service User's priority level and call arrival time.

PRP003 – The network shall support the capability to inform the MMPS Service User about the status of the MMPS session (e.g., tones or signaling messages can be used to indicate that the session request has been queued).

3.6 Priority for Data Services

EL001 – It shall be possible to provide priority for data services for a MMPS Service User on-demand, i.e., if and when MMPS Service User requires it.

EL002 – It shall be possible for an MMPS Service User to invoke priority for data services using a secure protocol interaction with the network. The priority shall be applicable until the MMPS Service User revokes it in an analogous fashion, or upon expiration of a timer.

EL003 – The invocation of priority by an MMPS Service User shall apply to all of the user's current data sessions, or to any new data session initiated by the MMPS Service User while priority is active.

EL004 – When an MMPS Service User invokes priority for data services for transport of any data packets to and from a Service User, the network should give priority in admission and retention of the data bearer (IP flow) and in packet data scheduling in the event of congestion (for new IP flows and upgrade to existing IP flows), subject to regional/national regulatory policy. Specifically:

- A MMPS data session should be given priority (advantage) for admission and retention over non-MMPS data sessions during times of congestion;
- Data packets belonging to an MMPS data service should not be dropped before data packets belonging to non-MMPS data service sessions, when the network is experiencing congestion. MMPS data session QoS, as required for the type of service invoked (e.g., packet delay), should be maintained throughout the activity of the data session.

3.7 MMPS Service User Priority Levels

PL001 – The MMPS Service User shall be assigned one of n user priority levels.

The user priority levels are defined with 1 being the highest user priority level and n being the lowest user priority level. In case of interconnecting networks with different priority levels, mappings between priority levels will have to be established based on service agreements.

3.8 Invocation on Demand

IOD001 – MMPS priority shall be invoked only when requested by the MMPS Service User. Priority access to system resources shall be allocated for the MMPS session according to the MMPS Service User's priority level.

If resources are available when MMPS is invoked for an originating session, the session shall proceed without delay.

An indication that this is an MMPS session should be propagated regardless of availability of resources in the originating network.

3.9 Roaming

R001 – MMPS shall be supported for the MMPS Service User during roaming when the serving network supports MMPS and appropriate roaming agreements are in place.

3.10 Handoff

Hand001 – MMPS shall be supported during the handoff.

This requirement is intended to ensure that the MMPS sessions continue to get priority treatment in the network during and after the handoff. This priority treatment applies both to bearer and signaling. This requirement also applies to inter-system and inter-technology handoffs if MMPS is supported by the target network.

3.11 Charging Data Record

CDR001 – A network supporting MMPS shall be capable of recording the following information in addition to non- MMPS information:

- MMPS invocation attempt and successful session set-up
- Call legs (originations and/or terminations) on which MMPS was used to gain access to resources
- Recording of Priority Service information, e.g., priority level

3.12 Queuing for Network Bearer Resources

QBR001 –MMPS shall enable priority capabilities in the core network for bearer resources (e.g., message queuing, MPLS[1] paths) for a MMPS session.

It shall be possible for a network operator to engineer network resources in support of MMPS.

3.13 Authorization

Auth001 - Access to MMPS shall be determined based on the subscriber's profile.

Auth002 – A network supporting MMPS shall be capable of specifying additional levels of authorization (e.g., use of a pin).

Auth003 - The network should be capable of preventing access by unauthorized MMPS users (e.g., “spoofed” users tying up resources with multiple originations).

3.14 MMPS Invocation

PSC001 – MMPS shall be capable of being invoked on a per-session basis by an explicit user action.

4 Use Cases

As described in the Introduction, Priority Service has been defined for traditional CDMA and GSM networks, and is currently offered as a service by some network providers. The goal of this document is to define the requirements that need to be supported in MMD-based Networks to enable MMPS. This section presents Use Cases for MMPS.

4.1 Use Case 1 – Mobile to Mobile Voice Call

A hurricane has hit a major metropolitan area. A government official tries to make a regular voice call to report the situation to his superiors but is unable to get access to the MMD-based wireless network. The government official tries the call again by using MMPS. The official dials the MMPS Service Code (SC) and the destination number. The wireless network recognizes the SC and is aware that an MMPS voice call is being attempted. The wireless network checks the subscription profile to ensure that the subscriber is allowed to make MMPS voice calls. The wireless network then attempts to allocate radio resources. All radio resources are busy and therefore the network radio queues the MMPS Service User's call request. The network allocates the next available radio network resource to the MMPS session and allows it to progress in the network. The call is destined to another mobile/wireless phone. The terminating mobile network also provides priority terminating access to the MMPS call. The call is terminated to its destination in the mobile network.

4.2 Use Case 2 – Mobile to PSTN Voice Call

This use case illustrates a scenario where an MMPS session originates in the MMD-based wireless network and terminates in the traditional PSTN. An MMPS Service User originates an MMPS session by dialing the SC and the destination number. The wireless network allocates radio network resources to the MMPS Service User with priority over other non-MMPS users under congestion conditions. The session request will be queued if no radio network resources are available. The MMPS session will get priority to radio network resources in the mobile network, and the network will pass on the priority service indication and the user's priority level when the session interconnects with the PSTN. It is expected that the session will receive priority access to resources in the PSTN. The session gets terminated to a PSTN endpoint.

4.3 Use Case 3 – Streaming Video

An MMPS Service User initiates a streaming video session to the control center related to a disaster. The MMPS streaming video session is initiated by the MMPS Service User invoking the SC, or by means a secure protocol interaction between Service User and an MMPS Application Function (AF). The Network recognizes the session as an MMPS session and tries to allocate radio resources for the streaming video session. If radio resources are not available, the session request is queued and the subscriber is informed of this action. The network will allocate the next available radio resource to the queued session request. Access to radio resources is determined by the user's priority level and the time of arrival in the queue. An MMPS session with a higher user priority level will get access to radio resources sooner then sessions with a user lower priority level. Access to radio resources for MMPS session requests with the same user priority level will be determined by the time of entry into the queue, i.e., first-in first-served. Once radio resources are available, the network will allocate the radio resources needed to transmit the streaming video. As data packets belonging to the MMPS streaming video session compete with non-priority data packets of admitted sessions, the MMPS packets will be scheduled for transmission in such a way that MMPS flow's QoS is maintained, as specified for streaming video service, while QoS of non-priority sessions may not be met throughout the duration of the sessions, e.g., due to radio access congestion.

4.4 Use Case 4 – VoIP

When a Service User initiates an MMPS session, the network recognizes the user as an MMPS subscriber requesting MMPS, and allocates network resources with priority over other non-MMPS subscribers attempting to initiate sessions, if congestion occurs.

If network resources (e.g., radio or other bearer access) are not immediately available, the network places the VoIP session request in a session (admission) request queue for the next available network resource.

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

MMPS information (e.g., user's priority level, MMPS indicator) associated with the VoIP session is conveyed end-to-end to be used for the session establishment.