**SA WG2 Meeting SA2#143-e S2-2xxxxxx**

**24 February - 9 March, 2021, Electronic meeting (revision of S2-2009413)**

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| *CR-Form-v12.0* |
| **CHANGE REQUEST** |
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|  | **23.501** | **CR** | **<CR#>** | **rev** | **<Rev#>** | **Current version:** | **16.6.0** |  |
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| *For* ***HE******LP*** *on using this form: comprehensive instructions can be found at http://www.3gpp.org/Change-Requests.* |
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| ***Proposed change affects:*** | UICC apps |  | ME |  | Radio Access Network |  | Core Network | **x** |

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| ***Title:***  | Multimedia Priority Service (MPS) Phase 2 support for Data Transport Service |
|  |  |
| ***Source to WG:*** | Perspecta Labs, CISA ECD, AT&T, T-Mobile USA, Nokia, Nokia Shanghai-Bell, Ericsson |
| ***Source to TSG:*** | SA2 |
|  |  |
| ***Work item code:*** | MPS2 |  | ***Date:*** | DD MM 2021 |
|  |  |  |  |  |
| ***Category:*** | **B** |  | ***Release:*** | Rel-17 |
|  | *Use one of the following categories:****F*** *(correction)****A*** *(mirror corresponding to a change in an earlier release)****B*** *(addition of feature),* ***C*** *(functional modification of feature)****D*** *(editorial modification)*Detailed explanations of the above categories canbe found in 3GPP TR 21.900. | *Use one of the following releases:Rel-8 (Release 8)Rel-9 (Release 9)Rel-10 (Release 10)Rel-11 (Release 11)Rel-12 (Release 12)**Rel-13 (Release 13)Rel-14 (Release 14)Rel-15 (Release 15)Rel-16 (Release 16)**Rel-17 (Release 17)* |
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| ***Reason for change:*** | MPS for DTS provides the Service User with priority for applications using the QoS Flow associated with the default QoS rule in the 5GS, to one or more selected active Data Networks (DNs), in periods of severe network congestion during which normal commercial data service is degraded. This CR supports stage 1 requirements, TS 22.153, clause 9.3.1:The system shall support:* MPS for DTS for an authorized Service User using a UE with a subscription for MPS, and
* MPS for DTS for an authorized Service User using a UE that does not have an MPS subscription.

TS 23.501 currently does not support MPS for DTS. |
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| ***Summary of change:*** | 1. Added a DTS abbreviation;
2. Added MPS for DTS in the clauses on MPS and invocation-related priority mechanisms; and
3. A few corrections/modifications in the QoS mechanism applied to etablished QoS flow clause.
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| ***Consequences if not approved:*** | No support for MPS for DTS in 5GC in Release 17. |
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| ***Clauses affected:*** | 3.2, 5.16.5, 5.22.3, 5.22.4 |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** | **X** |  |  Other core specifications  | CR for TS 23.502 and CR for 23.503 |
| ***affected:*** |  | **X** |  Test specifications | TS/TR ... CR ...  |
| ***(show related CRs)*** |  | **X** |  O&M Specifications | TS/TR ... CR ...  |
|  |  |
| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** |

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| This CR updates endorsed Draft CR S2-2009413 from meeting SA2#142-e, November 16-20, 2020 based on additional discussion with stakeholders. |

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*FIRST CHANGE*

## 3.2 Abbreviations

For the purposes of the present document, the abbreviations given in TR 21.905 [1] and the following apply. An abbreviation defined in the present document takes precedence over the definition of the same abbreviation, if any, in TR 21.905 [1].

5GC 5G Core Network

5GLAN 5G Local Area Network

5GS 5G System

5G-AN 5G Access Network

5G-EIR 5G-Equipment Identity Register

5G-GUTI 5G Globally Unique Temporary Identifier

5G-BRG 5G Broadband Residential Gateway

5G-CRG 5G Cable Residential Gateway

5G-RG 5G Residential Gateway

5G-S-TMSI 5G S-Temporary Mobile Subscription Identifier

5QI 5G QoS Identifier

AF Application Function

AMF Access and Mobility Management Function

AS Access Stratum

ATSSS Access Traffic Steering, Switching, Splitting

ATSSS-LL ATSSS Low-Layer

AUSF Authentication Server Function

BSF Binding Support Function

CAG Closed Access Group

CAPIF Common API Framework for 3GPP northbound APIs

CHF Charging Function

CN PDB Core Network Packet Delay Budget

CP Control Plane

DL Downlink

DN Data Network

DNAI DN Access Identifier

DNN Data Network Name

DRX Discontinuous Reception

DS-TT Device-side TSN translator

DTS Data Transport Service

ePDG evolved Packet Data Gateway

EBI EPS Bearer Identity

FAR Forwarding Action Rule

FN-BRG Fixed Network Broadband RG

FN-CRG Fixed Network Cable RG

FN-RG Fixed Network RG

FQDN Fully Qualified Domain Name

GFBR Guaranteed Flow Bit Rate

GMLC Gateway Mobile Location Centre

GPSI Generic Public Subscription Identifier

GUAMI Globally Unique AMF Identifier

HR Home Routed (roaming)

IAB Integrated access and backhaul

I-SMF Intermediate SMF

LADN Local Area Data Network

LBO Local Break Out (roaming)

LMF Location Management Function

LPP LTE Positioning Protocol

LRF Location Retrieval Function

MCX Mission Critical Service

MDBV Maximum Data Burst Volume

MFBR Maximum Flow Bit Rate

MICO Mobile Initiated Connection Only

MPS Multimedia Priority Service

MPTCP Multi-Path TCP Protocol

N3IWF Non-3GPP InterWorking Function

N5CW Non-5G-Capable over WLAN

NAI Network Access Identifier

NEF Network Exposure Function

NF Network Function

NGAP Next Generation Application Protocol

NID Network identifier

NPN Non-Public Network

NR New Radio

NRF Network Repository Function

NSI ID Network Slice Instance Identifier

NSSAI Network Slice Selection Assistance Information

NSSF Network Slice Selection Function

NSSP Network Slice Selection Policy

NW-TT Network-side TSN translator

NWDAF Network Data Analytics Function

PCF Policy Control Function

PDR Packet Detection Rule

PDU Protocol Data Unit

PEI Permanent Equipment Identifier

PER Packet Error Rate

PFD Packet Flow Description

PPD Paging Policy Differentiation

PPF Paging Proceed Flag

PPI Paging Policy Indicator

PSA PDU Session Anchor

QFI QoS Flow Identifier

QoE Quality of Experience

RACS Radio Capabilities Signalling optimisation

(R)AN (Radio) Access Network

RG Residential Gateway

RQA Reflective QoS Attribute

RQI Reflective QoS Indication

RSN Redundancy Sequence Number

SA NR Standalone New Radio

SBA Service Based Architecture

SBI Service Based Interface

SCP Service Communication Proxy

SD Slice Differentiator

SEAF Security Anchor Functionality

SEPP Security Edge Protection Proxy

SMF Session Management Function

SMSF Short Message Service Function

SN Sequence Number

SNPN Stand-alone Non-Public Network

S-NSSAI Single Network Slice Selection Assistance Information

SSC Session and Service Continuity

SSCMSP Session and Service Continuity Mode Selection Policy

SST Slice/Service Type

SUCI Subscription Concealed Identifier

SUPI Subscription Permanent Identifier

SV Software Version

TAC IMEI Type Allocation Code

TNAN Trusted Non-3GPP Access Network

TNAP Trusted Non-3GPP Access Point

TNGF Trusted Non-3GPP Gateway Function

TNL Transport Network Layer

TNLA Transport Network Layer Association

TSC Time Sensitive Communication

TSN Time Sensitive Networking

TSP Traffic Steering Policy

UCMF UE radio Capability Management Function

UDM Unified Data Management

UDR Unified Data Repository

UDSF Unstructured Data Storage Function

UL Uplink

UL CL Uplink Classifier

UPF User Plane Function

URLLC Ultra Reliable Low Latency Communication

URRP-AMF UE Reachability Request Parameter for AMF

URSP UE Route Selection Policy

VID VLAN Identifier

VLAN Virtual Local Area Network

W-5GAN Wireline 5G Access Network

W-5GBAN Wireline BBF Access Network

W-5GCAN Wireline 5G Cable Access Network

W-AGF Wireline Access Gateway Function

*SECOND CHANGE*

### 5.16.5 Multimedia Priority Services

TS 22.153 [24] specifies the service requirements for Multimedia Priority Service (MPS). MPS allows Service Users (as per TS 22.153 [24]) priority access to system resources in situations such as during congestion, creating the ability to deliver or complete sessions of a high priority nature. Service Users are government-authorized personnel, emergency management officials and/or other authorized users. MPS supports priority sessions on an "end-to-end" priority basis.

MPS is based on the ability to invoke, modify, maintain and release sessions with priority, and deliver the priority media packets under network congestion conditions. MPS is supported in a roaming environment when roaming agreements are in place and where regulatory requirements apply.

NOTE 1: If a session terminates on a server in the Internet (e.g. web-based service), then the remote end and the Internet transport are out of scope for this specification.

A Service User may use an MPS-subscribed UE or any other UE to obtain MPS. An MPS-subscribed UE obtains priority access to the Radio Access Network by using the Unified Access Control mechanism according to TS 22.261 [2]. This mechanism provides preferential access to UEs based on its assigned Access Identity. If an MPS-subscribed UE belongs to the special Access Identity as defined in TS 22.261 [2], the UE has preferential access to the network compared to ordinary UEs in periods of congestion.

MPS subscription allows users to receive priority services, if the network supports MPS. MPS subscription entitles a USIM with special Access Identity. MPS subscription includes indication for support of priority PDU connectivity service including MPS for DTS, and IMS priority service support for the end user. Priority level regarding QoS Flows and IMS are also part of the MPS subscription information. The usage of priority level is defined in TS 22.153 [24], TS 23.503 [45] and TS 23.228 [15].

NOTE 2: The term "Priority PDU connectivity services" is used to refer to 5G System functionality that corresponds to the functionality as provided by LTE/EPC Priority EPS bearer services in clause 4.3.18.3 of TS 23.401 [26].

MPS includes signalling priority and media priority. All MPS-subscribed UEs get priority for QoS Flows (e.g., used for IMS signalling) when established to the DN that is configured to have priority for a given Service User by setting MPS-appropriate values in the QoS profile in the UDM.

Service Users are treated as On Demand MPS subscribers or not, based on regional/national regulatory requirements. On Demand service is based on Service User invocation/revocation explicitly and applied to the media QoS Flows being established. When not On Demand, MPS service does not require invocation, and provides priority treatment for all QoS Flows only to the DN that is configured to have priority for a given Service User after attachment to the 5G network.

MPS for DTS is an on-demand service that may be invoked/revoked by an authorized MPS Service User using a UE with a subscription for MPS (i.e., according to its MPS profile), or using a UE that does not have a subscription for MPS (i.e., using authorization methods outside the scope of 3GPP).

MPS for DTS is the means for an AF to invoke/revoke Priority PDU Connectivity service. The AF authorizes MPS for DTS requests. When invoked by an AF, MPS for DTS applies to existing QoS Flows associated to the default QoS rule in a specific DNN.  For MPS for DTS, the AF may also create an SDF for priority signaling between the UE and the AF.

NOTE 3: According to regional/national regulatory requirements and operator policy, On-Demand MPS (including MPS for DTS) Service Users can be assigned the highest priority.

NOTE 4: MPS for DTS can be applied to any DNN other than the well-known DNN for IMS.

Priority treatment is applicable to IMS based multimedia services and priority PDU connectivity service including MPS for DTS.

Priority treatment for MPS includes priority message handling, including priority treatment during authentication, security, and Mobility Management procedures.

Priority treatment for MPS session requires appropriate ARP and 5QI (plus 5G QoS characteristics) setting for QoS Flows according to the operator's policy.

NOTE 5: Use of QoS Flows for MPS with QoS characteristics signalled as part of QoS profile enables the flexible assignment of 5G QoS characteristics (e.g. priority level) for MPS.

When an MPS session is requested by a Service User, the following principles apply in the network:

- QoS Flows employed in an MPS session shall be assigned ARP value settings appropriate for the priority level of the Service User.

- Setting ARP pre-emption capability and vulnerability for MPS QoS Flows, subject to operator policies and depending on national/regional regulatory requirements.

- Pre-emption of non-Service Users over Service Users during network congestion situation, subject to operator policy and national/regional regulations.

The terminating network identifies the priority of the MPS session and applies priority treatment, including paging with priority, to ensure that the MPS session can be established with priority to the terminating user (either a Service User or normal user).

MPS priority mechanisms can be classified as subscription-related, invocation-related, and those applied to existing QoS Flows. Subscription related mechanisms, as described in clause 5.22.2, are further divided into two groups: those which are always applied and those which are conditionally applied. Invocation-related mechanisms, as described in clause 5.22.3, are further divided into three groups: those that apply for mobile originated SIP call/sessions, those that apply for mobile terminated SIP call/sessions, and those that apply for the Priority PDU connectivity services including MPS for DTS. Methods applied to existing QoS Flows focus on handover and congestion control and are described in clause 5.22.4.

NOTE: The network can hide its topology from the AF supporting MPS for DTS. At the same time, the UE needs to provide its locally known IP address to the AF supporting MPS for DTS to support interactions with the applicable PCF. Thus, there can be no NAT of the UE IP address between the UPF and the AF supporting MPS for DTS.

*THIRD CHANGE*

### 5.22.3 Invocation-related Priority Mechanisms

The generic mechanisms used based on invocation-related Priority Mechanisms for prioritised services are based an interaction with an Application Function and between the Application Function and the PCF over Rx/N5 interface.

These mechanisms apply to mobile originated as well as mobile terminated SIP call/sessions (TS 23.228 [15], clause 5.21) and Priority PDU connectivity services including MPS for DTS.

NOTE: Clause 5.21 in TS 23.228 [15] is applicable to 5GS, with the understanding that the term PCRF corresponds to PCF in the 5GS.

Invocation-related mechanisms for Mobile Originations e.g. via SIP/IMS:

- PCF: When an indication for a session arrives over the Rx/N5 Interface and the UE does not have priority for the signalling QoS Flow, the PCF derives the ARP and 5QI parameters, plus associated QoS characteristics as appropriate, of the QoS Flow for Signalling as per Service Provider policy as specified in clause 6.1.3.11 of TS 23.503 [45].

- PCF: For sessions such as MPS, when establishing or modifying a QoS Flow for media as part of the session origination procedure, the PCF selects the ARP and 5QI parameters, plus associated QoS characteristics as appropriate, to provide priority treatment to the QoS Flow(s).

- PCF: When all active sessions to a particular DN are released, and the UE is not configured for priority treatment to that particular PDU Session for a DN, the PCF will downgrade the IMS Signalling QoS Flows from appropriate settings of the ARP and 5QI parameters, plus associated QoS characteristics as appropriate, to those entitled by the UE based on subscription.

Invocation-related mechanisms for Mobile Terminations e.g. via SIP/IMS:

- PCF: When an indication for a session arrives over the Rx/N5 Interface, mechanisms as described above for Mobile Originations are applied.

- UPF: If an IP packet arrives at the UPF for a UE that is CM-IDLE, the UPF sends a "Data Notification" including the information to identify the QoS Flow for the DL data packet to the SMF, as specified in clause 4.2.3.3 of TS 23.502 [3].

- SMF: If a " Data Notification" message arrives at the SMF for a QoS Flow associated with an ARP priority level value that is entitled for priority use, delivery of priority indication during the Paging procedure is provided by inclusion of the ARP in the N11 interface "N1N2MessageTransfer" message, as specified in clause 4.2.3.3 of TS 23.502 [3].

- AMF: If an "N1N2MessageTransfer" message arrives at the AMF containing an ARP priority level value that is entitled for priority use, the AMF handles the request with priority and includes the "Paging Priority" IE in the N2 "Paging" message set to a value assigned to indicate that there is an IP packet at the UPF entitled to priority treatment, as specified in clause 4.2.3.3 of TS 23.502 [3].

- SMF: For a UE that is not configured for priority treatment, upon receiving the "N7 Session Management Policy Modification" message from the PCF with an ARP priority level that is entitled for priority use, the SMF sends an "N1N2MessageTransfer" to update the ARP for the Signalling QoS Flows, as specified in clause 4.3.3.2 of TS 23.502 [3].

- AMF: Upon receiving the "N1N2MessageTransfer" message from the SMF with an ARP priority level that is entitled for priority use, the AMF updates the ARP for the Signalling QoS Flows, as specified in clause 4.3.3.2 of TS 23.502 [3].

- (R)AN: Inclusion of the "Paging Priority" in the N2 "Paging" message triggers priority handling of paging in times of congestion at the (R)AN as specified in clause 4.2.3.3 of TS 23.502 [3].

Invocation-related mechanisms for the Priority PDU connectivity services:

- PCF: If the state of the Priority PDU connectivity services is modified from disabled to enabled, the QoS Flow(s) controlled by the Priority PDU connectivity services are established/modified to have the service appropriate settings of the ARP and 5QI parameters, plus associated QoS characteristics as appropriate, using the PDU Session Modification procedure as specified in clause 4.3.3 of TS 23.502 [3].

- PCF: If the state of Priority PDU connectivity services is modified from enabled to disabled, the QoS Flow(s) controlled by the Priority PDU connectivity services are modified from Priority PDU Connectivity Service appropriate settings of the ARP and 5QI parameters, plus associated QoS characteristics as appropriate, to those entitled by the UE as per subscription, using the PDU Session Modification procedure as specified in clause 4.3.3 of TS 23.502 [3].

Invocation-related mechanisms for MPS for DTS:

- PCF: When the PCF receives from the AF a request to invoke MPS for DTS, the QoS Flow(s) associated with the default QoS rule to a specific DNN and S-NSSAI (determined by the PCF based on configuration) is modified, to have the service appropriate settings of the ARP and 5QI parameters, plus associated QoS characteristics as appropriate, using the PDU Session Modification procedure as specified in clause 4.3.3 of TS 23.502 [3]. PCC rules are modified as described in clause 6.1.3.11 in TS 23.503 [45].

- PCF: When the PCF receives from the AF a request to revoke MPS for DTS, the QoS Flow(s) associated with the default QoS rule to a specific DNN and S-NSSAI (determined by the PCF based on configuration) are modified from MPS for DTS appropriate settings of the ARP and 5QI parameters, plus associated QoS characteristics as appropriate, to those otherwise entitled by the UE, e.g., as per subscription, using the PDU Session Modification procedure as specified in clause 4.3.3 of TS 23.502 [3]. PCC rules are modified as described in clause 6.1.3.11 in TS 23.503 [45].

*FOURTH AND LAST CHANGE*

### 5.22.4 QoS Mechanisms applied to established QoS Flows

Mechanisms applied to established QoS Flows:

- (R)AN: QoS Flows requested in the Xn "Handover Request" or N2 "Handover Request" which are marked as entitled to priority by virtue of inclusion of an ARP value from the set allocated by the Service Provider for prioritised services are given priority over requests for QoS Flows which do not include an ARP from the set as specified in clause 4.9 of TS 23.502 [3].

- SMF: Congestion management procedures in the SMF will provide priority to QoS Flows established for sessions during periods of extreme overload. Prioritised services are exempt from any session management congestion controls. See clause 5.19.

- AMF: Congestion management procedures in the AMF will provide priority to Mobility Management procedures required for the prioritised services during periods of extreme overload. Prioritised services are exempt from Mobility Restrictions and any Mobility Management congestion controls. See clauses 5.3.4.1.1 and 5.19.5.

- QoS Flows whose ARP parameter is from the set allocated by the Service Provider for prioritised services' use shall be exempt from release during QoS Flow load rebalancing.

- (R)AN, UPF: IMS Signalling Packets associated with prioritised services' use are handled with priority. Specifically, during times of severe congestion when it is necessary to drop packets on the IMS Signalling QoS Flow, or QoS flow supporting MPS for DTS signaling, to ensure network stability, these FEs shall drop packets not associated with priority signalling such as MPS or Mission Critical services before packets associated with priority signalling. See clauses 5.16.5 and 5.16.6.

- (R)AN, UPF: During times of severe congestion when it is necessary to drop packets on a media QoS Flow to ensure network stability, these FEs shall drop packets not associated with priority sessions such as MPS or Mission Critical services before packets associated with priority sessions. See clauses 5.16.5 and 5.16.6.

*END OF CHANGES*