**3GPP TSG-SA WG2 Meeting #166 *S2-2412895***

18 November - 22 November 2024, Orlando, USA (revision of S2-2408103,10160, 11198,12375)

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| *CR-Form-v12.2* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  | **23.501** | **CR** | **5524** | **rev** | **5** | **Current version:** | **19.1.0** |  |
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| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* | | | | | | | | |
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| ***Proposed change affects:*** | UICC apps |  | ME |  | Radio Access Network | **X** | Core Network | **X** |

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| ***Title:*** | Support Alternative QoS profile with PDU Set QoS and Notification Control | | | | | | | | | |
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| ***Source to WG:*** | CATT, Nokia, Tencent, vivo, Samsung, Xiaomi | | | | | | | | | |
| ***Source to TSG:*** | SA2 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | XRM\_Ph2 | | | | |  | ***Date:*** | | | 2024-11-01 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **B** |  | | | | | ***Release:*** | | | Rel-19 |
|  | *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 can be found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | | | | | | | | *Use one of the following releases: Rel-8 (Release 8) Rel-9 (Release 9) Rel-10 (Release 10) Rel-11 (Release 11) … Rel-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18) Rel-19 (Release 19)* | |
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| ***Reason for change:*** | | To implement the conclusion in clauses 8.1.2 and 8.1.3 of TR23.70-70 to support PDU Set QoS Notification without AQP, PDU Set QoS control with Alternative PDU Set QoS profile and Notification Control with Alternative PDU Set QoS profile. | | | | | | | | |
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| ***Summary of change:*** | | There are two ways to implement the change:  One is to changes to the existing clauses and to provide additional changes on the Notification Control on PDU Set QoS and Alternative PDU Set QoS profile(s) at the end of each related clause.  Another is to add a new clause 5.7.2.4.1c to provide a detailed description of the Notification Control on PDU Set QoS and Alternative PDU Set QoS profile(s), other clauses provide a short description and reference to the new clause. | | | | | | | | |
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| ***Consequences if not approved:*** | | The Alternative PDU Set QoS profile based PDU Set QoS Control and Notification control cannot be supported. | | | | | | | | |
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| ***Clauses affected:*** | | 5.7.1.2a, 5.7.4.1, 5.7.2.4.1a | | | | | | | | |
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|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **X** | Other core specifications | | | | TS/TR ... CR ... | | |
| ***affected:*** | |  | **X** | Test specifications | | | | TS/TR ... CR ... | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

## **FIRST CHANGE**

#### 5.7.1.2a Alternative QoS Profile

The Alternative QoS Profile(s) can be optionally provided for a GBR QoS Flow with Notification control enabled. If the corresponding PCC rule contains the related information (as described in TS 23.503 [45]), the SMF shall provide, in addition to the QoS profile, a prioritized list of Alternative QoS Profile(s) to the NG-RAN. If the SMF provides a new prioritized list of Alternative QoS Profile(s) to the NG-RAN (if the corresponding PCC rule information changes), the NG-RAN shall replace any previously stored list with it.

An Alternative QoS Profile represents a combination of QoS parameters PDB, PER, Averaging Window and GFBR to which the application traffic is able to adapt. When the QoS Profile contains PDU Set QoS parameters PSDB and PSER in UL and/or DL as described in clause 5.7.7, the corresponding Alternative QoS Profile(s) shall also contain the PDU Set QoS parameters PSDB and PSER in the respective direction(s); otherwise, the corresponding Alternative QoS Profile(s) should not contain the PDU Set QoS parameters PSDB and PSER.

NOTE 1: There is no requirement that the GFBR monotonically decreases, nor that the PDB or PER (or PSDB or PSER) monotonically increase as the Alternative QoS Profiles become less preferred.

For a GBR QoS Flow using the Delay-critical resource type, an Alternative QoS Profile may also include the QoS parameter MDBV.

For the NG-RAN determination whether the GFBR, the PDB and the PER (or the GFBR, the PSDB and the PSER) can be fulfilled (i.e. for all Notification control scenarios described in clause 5.7.2.4), the NG-RAN shall also apply the value of the optional QoS parameter present in an Alternative QoS Profile instead of the corresponding QoS parameter's value in the QoS Profile (which is either provided explicitly or implicitly via the standardized 5QI QoS characteristics defined in clause 5.7.4) for every optional QoS parameter present in an Alternative QoS Profile (e.g. MDBV).

NOTE 2: For the NG-RAN behaviour related to the mandatory QoS parameters in the Alternative QoS Profile (i.e. GFBR, PDB, PER), see clause 5.7.2.4.

When the NG-RAN sends a notification to the SMF that the QoS profile is not fulfilled, the NG-RAN shall, if the currently fulfilled values match an Alternative QoS Profile, include also the reference to the Alternative QoS Profile to indicate the QoS that the NG-RAN currently fulfils (see clause 5.7.2.4). The NG-RAN shall enable the SMF to determine when an NG-RAN node supports the Alternative QoS Profile feature but cannot fulfil even the least preferred Alternative QoS Profile.

NOTE 3: To reduce the risk that GBR QoS Flows are released in case of RAN resource limitations (and then experience difficulties in being re-established), Application Functions can set the least preferred Alternative Service Requirement to an undemanding level.

Editor Note: How to support Alternative QoS profile for PDU Set QoS in one direction is FFS.

## **NEXT CHANGE**

5.7.2.4 Notification control

5.7.2.4.1 General

The QoS Parameter Notification control indicates to the NG-RAN that notifications of "GFBR can no longer (or can again) be guaranteed" are requested when the NG-RAN determines that the GFBR, the PDB or the PER of the QoS profile cannot be fulfilled (or can be fulfilled again) for a QoS Flow (during the lifetime of the QoS Flow) and that the QoS Flow should be kept while the NG-RAN is not fulfilling the requested QoS profile. Notification control may be used for a GBR QoS Flow if the application traffic is able to adapt to the change in the QoS (e.g. if the AF is capable to trigger rate adaptation).

The NG-RAN determination whether the GFBR, the PDB and the PER can be fulfilled or not, is done under consideration of the QoS parameters Averaging Window and MDBV (for a GBR QoS Flow using the Delay-critical resource type), which are either provided explicitly as part of the QoS profile or implicitly via the standardized 5QI QoS characteristics defined in clause 5.7.4.

The SMF shall only enable Notification control when the QoS Notification Control parameter is set in the PCC rule (received from the PCF) that is bound to the QoS Flow. The Notification control parameter is signalled to the NG-RAN as part of the QoS profile.

If the NG-RAN has received the PDU Set QoS parameters PSDB and PSER for UL and/or DL (as described in clause 5.7.7) and PDU Set QoS handling is applied in the respective direction(s), the NG-RAN uses the PSDB and PSER instead of the PDB and PER in the respective direction(s) for the actions described in clauses 5.7.2.4, 5.7.2.4.1, 5.7.2.4.1a, 5.7.2.4.1b, 5.7.2.4.2 and 5.7.2.4.3.

5.7.2.4.1a Notification Control without Alternative QoS Profiles

If, for a given GBR QoS Flow, Notification control is enabled and the NG-RAN determines that the GFBR, the PDB or the PER of the QoS profile cannot be fulfilled, NG-RAN shall send a notification towards SMF that the "GFBR can no longer be guaranteed". Furthermore, the NG-RAN shall keep the QoS Flow (i.e. while the NG-RAN is not fulfilling the requested QoS profile for this QoS Flow), unless specific conditions at the NG-RAN require the release of the NG-RAN resources for this GBR QoS Flow, e.g. due to Radio link failure or RAN internal congestion. The NG-RAN should try to fulfil the GFBR, the PDB and the PER of the QoS profile again.

NOTE 1: NG-RAN can decide that the "GFBR can no longer be guaranteed" based on, e.g. measurements like queuing delay or system load.

Upon receiving a notification from the NG-RAN that the "GFBR can no longer be guaranteed", the SMF may forward the notification to the PCF, see TS 23.503 [45].

When the NG-RAN determines that the GFBR, the PDB and the PER of the QoS profile can be fulfilled again for a QoS Flow (for which a notification that the "GFBR can no longer be guaranteed" has been sent), the NG-RAN shall send a notification, informing the SMF that the "GFBR can again be guaranteed" and the SMF may forward the notification to the PCF, see TS 23.503 [45]. The NG-RAN shall send a subsequent notification that the "GFBR can no longer be guaranteed" whenever necessary.

NOTE 2: It is assumed that NG-RAN implementation will apply some hysteresis before determining that the "GFBR can again be guaranteed" and therefore a frequent signalling of "GFBR can again be guaranteed" followed by "GFBR can no longer be guaranteed" is not expected.

NOTE 3: If the QoS Flow is modified, the NG-RAN restarts the check whether the "GFBR can no longer be guaranteed" according to the updated QoS profile. If the Notification control parameter is not included in the updated QoS profile, the Notification control is disabled.

During a handover, the Source NG-RAN does not inform the Target NG-RAN about whether the Source NG-RAN has sent a notification for a QoS Flow that the "GFBR can no longer be guaranteed". The Target NG-RAN performs admission control rejecting any QoS Flows for which resources cannot be permanently allocated. The accepted QoS Flows are included in the N2 Path Switch Request or N2 Handover Request Acknowledge message from the NG-RAN to the AMF. The SMF shall interpret the fact that a QoS Flow is listed as transferred QoS Flow in the Nsmf\_PDUSession\_UpdateSMContext Request received from the AMF as a notification that "GFBR can again be guaranteed" for this QoS Flow unless the SMF is also receiving a reference to an Alternative QoS Profile for this QoS Flow (which is described in clause 5.7.2.4.2). After the handover is successfully completed, the Target NG-RAN shall send a subsequent notification that the "GFBR can no longer be guaranteed" for such a QoS Flow whenever necessary. If the SMF has previously notified the PCF that the "GFBR can no longer be guaranteed" and the SMF does not receive an explicit notification that the "GFBR can no longer be guaranteed" for that QoS Flow from the Target NG-RAN within a configured time, the SMF shall notify the PCF that the "GFBR can again be guaranteed".

If the PDU Set QoS handling is applied in UL and/or DL, the NG-RAN uses the PDU Set QoS parameters PSDB and PSER for UL and/or DL instead of PDB and PER in the respective direction(s) to determine whether to notify "GFBR can no longer be guaranteed" or "GFBR can again be guaranteed".

## **END of CHANGES**