**3GPP TSG-SA2 Meeting #158 S2-2309356-merger**

**21 - 25 August, 2023, Goteborg, Sweden *revision of S2-2309356***

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| *CR-Form-v12.1* |
| **CHANGE REQUEST** |
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|  | **23.502** | **CR** | **4441** | **rev** | **-** | **Current version:** | 18.2.0 |  |
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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 |  | Core Network | **X** |

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| ***Title:***  | Corrections on Planned Data Transfer with QoS (PDTQ) Policy |
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| ***Source to WG:*** | Samsung, Huawei? |
| ***Source to TSG:*** | SA2 |
|  |  |
| ***Work item code:*** | AIMLsys |  | ***Date:*** |  2023-08-11 |
|  |  |  |  |  |
| ***Category:*** | **F** |  | ***Release:*** | Rel-18 |
|  | *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](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-15 (Release 15)Rel-16 (Release 16)Rel-17 (Release 17)Rel-18 (Release 18)* |
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| ***Reason for change:*** | Several corrections are introduced to clarify the functionality introduced in R18 related to PDTQ policies for assisting AI/ML-based services. Operation execution result indications of the service operation is missing in the NEF and PCF services related to PDTQ polices. During the PDTQ re-negotation, the AF may not select any of the PDTQ policy candidates send by the PCF. In this case, the AF needs to notify the PCF of that no policy is selected. However, in the current procedures or services, the AF cannot indicate the decision to the PCF.  |
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| ***Summary of change:*** | * General description of PDTQ policy re-negotiation is introduced
* ‘Result Indication’ is introduced to NEF and PCF services related to PDTQ polices.
* Change the PDTQ refernce ID and PDTQ policy to optional input in Npcf\_PDTQPolicyControl\_Update service and Nnef\_PDTQPolicyNegotiation\_Update service, and add a corrsponding note saying that the PDTQ policy and ID are only included as input if the AF selects one of the policies provied by the PCF.
* Miscellaneous editorial corrections.
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| ***Consequences if not approved:*** | * The operation execution result of the NEF and PCF services related to PDTQ polices cannot be indicated. And the corresponding following procedures cannot be preformed correctly.
* The AF cannot indicate that no PDTQ policy is selected during the re-negotiation.
* Unclear spec text
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| ***Clauses affected:*** | 4.16.15.1, 4.16.15.2.1, 4.16.15.2.2, 5.2.5.9.1, 5.2.5.9.2, 5.2.5.9.3, 5.2.5.9.4, 5.2.6.30.1, 5.2.6.30.2, 5.2.6.30.3, 5.2.6.30.4 |
|  |  |
|  | **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:*** |  |

\* \* \*Start of Changes \* \* \*

#### 4.16.15.1 General

The intent of this clause is to specify generic service procedures to enable the AF to negotiate viable time window for the planned application data transfer with specific QoS requirements and operational conditions via the support of the NEF.

The PDTQ policies are defined for a specific ASP, and each PDTQ policy includes a recommended time window for the traffic transfer for each of the AF sessions for each of the UEs involved.

The Network Performance analytics or DN Performance analytics for NWDAF as described in TS 23.288 [50] will be subscribed by the PCF to assist its decision to derive the PDTQ policies.

One or more negotiated PDTQ policies could be provided by PCF to AF via NEF together with the PDTQ Reference ID. If the AF receives more than one PDTQ policies from the PCF, the AF will select one of them and inform the PCF about the selected PDTQ policy which will then be stored in the UDR. The selected PDTQ policy might be renegotiated, i.e. due to the degradation of the network performance. In this case, the PCF may determine a new list of candidate PDTQ policies and notify the AF via NEF. The AF may select one of the new PDTQ polices or determine there is no acceptable PDTQ policy and then notify the PCF of the corresponding decision. Prior to the start of the Desired Time Window for the planned data transfer, the AF requests the PCF to set up the AF session with required QoS. The PCF will then determine the appropriate PCC rules according to the AF request.

\* \* \*Next Change \* \* \*

##### 4.16.15.2.1 Procedures for negotiation of planned data transfer with QoS requirements

This clause describes the PDTQ procedures to negotiate viable time window for the planned application data transfer via the support of the NEF.



Figure 4.16.15.2.1-1: Negotiation for planned data transfer with QoS requirements

Prior to the transmission of the Application AI/ML data, the AF negotiates with the 5G Core for the PDTQ policies to provide assistance for its application data transfer. The AF discovers its serving NEF, if it has not done so, using the mechanism as described in clause 6.3.14 of TS 23.501 [2].

1a. The AF invokes the Nnef\_PDTQPolicyNegotiation\_Create Request (ASP Identifier, Number of UEs, list of Desired time windows, QoS Reference or individual QoS parameters, Alternative Service Requirements (optional), Network Area Information, Request for notification, Application Identifier). The Request for notification is an indication that PDTQ warning notification can be sent to the AF.

NOTE 1: Based on AF's internal logic (policy), the AF may determine the minimum QoS requirements based on the UEs who are expected to participate in the Desired time window and the network input data and the group application data transfer trigger conditions.

1b-1c. The NEF may authenticate the AF and authorize the PDTQ request from the AF. If the authentication/authorization of the AF's request has failed, the NEF will respond to the AF's request through the Nnef\_PDTQPolicyNegotiation\_Create Response with a failure result and the following steps are skipped.

 The NEF may map the ASP ID into DNN and S-NSSAI to be used in step 2.

NOTE 2: The Application ID provided by the AF and the Application ID provided to NWDAF can be different, and then a mapping will be performed in the PCF.

2. Based on an AF request, the NEF may translate the information provided by the AF (e.g. Network Area Information, etc.) based on the local policy and invokes the Npcf\_PDTQPolicyControl\_Create (ASP Identifier, Number of UEs, list of Desired time windows, QoS Reference or individual QoS parameters, Alternative Service Requirements (optional), Network Area Information, Request for notification, Application Identifier) with the H-PCF to authorize the creation of the policy regarding the PDTQ. If the PCF was provided with Request for notification, then PCF will send PDTQ warning notification to the AF as specified in clause 4.16.15.2.2 to notify the AF when the network performance or DN Performance in the area of interest reaches the Reporting Threshold set by the PCF based on operator configuration or the PCF determines to update the previously selected PDTQ policy based on the on the latest periodically reported analytics information as described in clause 6.1.2.7 of TS 23.503 [20].

 The PCF may be configured to map the ASP identifier to a target DNN and S-NSSAI if the NEF did not provide the DNN, S-NSSAI to the PCF.

3. H-PCF queries the UDR to retrieve all existing PDTQ polices for all the ASPs using Nudr\_DM\_Query (Policy Data, Planned Data Transfer with QoS requirements) service operation.

4. The UDR provides all the stored PDTQ policies and corresponding related information (e.g. the Number of UEs, the list of Desired time windows) to the H-PCF.

5. Based on information provided by the AF and other available information, the H-PCF queries or/and subscribes to the NWDAF as defined in clause 6.6.4 or clause 6.14.4 of TS 23.288 [50] to request the Network Performance analytics or the DN Performance analytics.

 When requesting the Network Performance analytics or the DN performance analytics, if "any UE" is used, then the AoI information is used to identify the target gNB(s) for the prediction of the availability of the network resources.

 The DNN, S-NSSAI and Application ID may be provided by H-PCF as Analytics Filter Information to requests or subscribes to the relevant Aanalytic ID.

6. By referring to the outcome of the analytics report as described in clause 6.1.2.7 of TS 23.503 [20], H-PCF determines one or more PDTQ policies. Each PDTQ policy includes a recommended time window for the traffic transfer for each of the AF sessions for each of the UEs involved.

7. The PCF sends one or more PDTQ policies to NEF in Npcf\_PDTQPolicyControl\_Create Response including the PDTQ Reference ID.

8. The NEF sends a Nnef\_PDTQPolicyNegotiation\_Create response to the AF to provide one or more PDTQ policies together with the PDTQ Reference ID. If the NEF received only one PDTQ policy from the PCF, steps 9-12 are not executed and the flow proceeds to step 13. Otherwise, the flow proceeds to step 9.

9. If more than one PDTQ policies were provided to the AF, the AF selects one of the PDTQ policies and notifies NEF for the selected PDTQ policy via Nnef\_PDTQPolicyNegotiation\_Update request together with the PDTQ Reference ID. The AF stores the PDTQ Reference ID for the future interaction with the PCF.

10-12. The NEF notifies H-PCF about the selected PDTQ policy by the AF. The H-PCF acknowledges NEF. The NEF responds to the AF request with a Nnef\_PDTQPolicyNegotiation\_Update Response.

13-14. The H-PCF stores the PDTQ Reference ID together with the new PDTQ policy in the UDR by invoking Nudr\_DM\_Update (PDTQ Reference ID, Policy Data, Planned Data Transfer with QoS requirements). The UDR sends a response to the H-PCF as acknowledgement.

\* \* \*Next Change \* \* \*

##### 4.16.15.2.2 Procedure for PDTQ warning notification



Figure 4.16.15.2.2-1: The procedure for PDTQ warning notification

1. The negotiation for PDTQ policy as described in clause 4.16.15.2.1 is completed. In addition, the PCF has subscribed to analytics on "Network Performance" or "DN Performance" from NWDAF for the area of interest and time window of a PDTQ policy following the procedures and services described in TS 23.288 [50], including a Reporting Threshold in the Analytics Reporting information. The value for Reporting Threshold is set by the PCF based on operator configuration.

2. The PCF is notified with the Network Performance analytics or DN Performance analytics in the area of interest from the NWDAF when the NWDAF determines that the Network Performance or DN Performance reaches the Reporting Threshold or with the periodically reported analytics information as described for the Network Performance analytics or DN Performance analytics in TS 23.288 [50]. The PCF determines to update previously selected PDTQ policies.

3. The H-PCF requests from the UDR the stored PDTQ policies using Nudr\_DM\_Query (Policy Data, Planned Data Transfer with QoS requirements) service operation.

4. The UDR provides all the PDTQ Policies together with the relevant information received from the AFs (as defined in clause 6.1.2.7 of TS 23.503 [20]) to the H-PCF.

5. The H-PCF identifies the PDTQ Policies affected based on the notification received from NWDAF. For each of them, the H-PCF determines the ASP of which the PDTQ traffic will be influenced by the degradation of network Performance or DN Performance and which requested the H-PCF to send the notification. The PCF then performs the following steps for each of the determined ASPs, i.e. Steps 6 - 16 can occur multiple times (i.e. once per ASP).

6. The PCF decides based on operator policies, whether a new list of candidate PDTQ policies can be calculated for the ASP. If the PCF does not find any new candidate PDTQ policy, the previously negotiated PDTQ policy shall be kept, no interaction with that ASP shall occur and the procedure stops for that PDTQ policy.

NOTE 1: The PDTQ policies of an ASP which did not request to be notified are kept and no interaction with this ASP occurs.

7. The PCF sets the no longer valid PDTQ policy in the UDR as invalidated by invoking Nudr\_DM\_Update (PDTQ Reference ID, invalidation flag) service.

8. The UDR sends a response to the H-PCF as acknowledgement.

9. The PCF sends the notification to the NEF by invoking Npcf\_PDTQPolicyControl\_Notify (PDTQ Reference ID, list of candidate PDTQ policies) service operation.

10. The NEF sends the PDTQ warning notification to the AF by invoking Nnef\_PDTQPolicyNegotiation\_Notify (PDTQ Reference ID, list of candidate PDTQ policies) service operation.

11. The AF checks the new PDTQ policies included in the candidate list in the PDTQ warning notification.

12. If the AF selects any of the new PDTQ policies, the steps 9-14 from clause 4.16.15.2.1 are executed.

13. If the AF doesn't select any of the new PDTQ policies, the steps 9-12 from clause 4.16.15.2.1 are executed. In this case, the PDTQ policy will not be included in the Npcf\_PDTQPolicyControl\_Update request or Nnef\_PDTQPolicyNegotiation\_Update request.

14-15. If the step 13 is executed, the PCF removes the no longer valid PDTQ policy from UDR for the corresponding PDTQ Reference ID.

NOTE 2: The PCF can also remove the invalidate PDTQ policy after an operator configured time for the case that the AF does not respond.

The AF can send a Stop notification by invoking Nnef\_PDTQPolicyNegotiation\_Update service, when the AF requests not to receive the PDTQ warning notification anymore. Then, the NEF invokes Npcf\_PDTQPolicyControl\_Update service in order to provide this information for the H-PCF.

\* \* \*Next Change \* \* \*

##### 5.2.5.9.1 General

**Service description:** This service provides functionality for negotiation and management of planned data transfer with QoS requirements policies (PDTQ policies), which includes the following functionalities:

- Determine PDTQ policies based on the request via NEF from AF; and

- Update PDTQ policies based on the selection provided by AF.

##### 5.2.5.9.2 Npcf\_PDTQPolicyControl\_Create service operation

**Service operation name:** Npcf\_PDTQPolicyControl\_Create

**Description:** This service is to create the PDTQ policy.

**Inputs, Required:** ASP identifier, Number of UEs, list of Desired time windows, QoS reference or individual QoS parameters as described in clause 6.1.3.22 of TS 23.503 [20].

**Inputs, Optional:** S-NSSAI, DNN, Network Area Information, Request for notification, Alternative Service Requirements.

**Outputs, Required:** Result Indication, One or more PDTQ policies, PDTQ Reference ID.

**Outputs, Optional:** None.

##### 5.2.5.9.3 Npcf\_PDTQPolicyControl\_Update service operation

**Service operation name:** Npcf\_PDTQPolicyControl\_Update

**Description:** This service is to update the PDTQ policy to the PCF.

**Inputs, Required:** PDTQ Reference ID.

**Inputs, Optional:** Stop notification, one PDTQ policy.

NOTE 1: PDTQ policy is only indicated if the AF selects one of the PDTQ policies provided by the PCF.

**Outputs, Required:** Result Indication.

**Outputs, Optional:** None.

##### 5.2.5.9.4 Npcf\_PDTQPolicyControl\_Notify service operation

**Service operation name:** Npcf\_PDTQPolicyControl\_Notify

**Description:** This service operation sends the PDTQ policy warning notification to the NF consumer.

**Inputs, Required:** PDTQ reference ID, list of candidate PDTQ policies.

**Inputs, Optional:** None.

**Outputs, Required:** Result Indication.

**Outputs, Optional:** None.

\* \* \*Next Change \* \* \*

##### 5.2.6.30.1 General

**Service description:** This service provides functionality for negotiation and management of planned data transfer with QoS requirements policies (PDTQ policies), which includes the following functionalities:

- Determine PDTQ policies based on the request from AF; and

- Update PDTQ policies based on the selection provided by AF.

##### 5.2.6.30.2 Nnef\_PDTQPolicyNegotiation\_Create service operation

**Service operation name:** Nnef\_PDTQPolicyNegotiation\_Create

**Description:** The consumer requests to create a PDTQ policy.

**Inputs, Required:** ASP Identifier, Number of UEs, list of Desired time windows, QoS reference or individual QoS parameters as described in clause 6.1.3.22 of TS 23.503 [20].

**Inputs, Optional:** Network Area Information, Request for notification, Alternative Service Requirements.

**Outputs, Required:** Result Indication, PDTQ Reference ID, one or more PDTQ policies.

**Output, Optional:** None.

##### 5.2.6.30.3 Nnef\_PDTQPolicyNegotiation\_Update service operation

**Service operation name:** Nnef\_PDTQPolicyNegotiation Update

**Description:** The consumer requests the selected PDTQ policy to be set.

**Inputs, Required:** PDTQ Reference ID.

**Inputs, Optional:** Stop notification, one PDTQ policy.

NOTE 1: PDTQ policy is only indicated if the AF selects one of the PDTQ policies provided by the PCF.

**Outputs, Required:** Result Indication.

**Outputs, Optional:** None.

##### 5.2.6.30.4 Nnef\_PDTQPolicyNegotiation\_Notify service operation

**Service operation name:** Nnef\_PDTQPolicyNegotiation\_Notify

**Description:** NEF sends the PDTQ policy warning notification to the NF consumer.

**Inputs, Required:** PDTQ reference ID, list of candidate PDTQ policies.

**Inputs, Optional:** None.

**Outputs, Required:** Result Indication.

\* \* \*End of Changes \* \* \*