**3GPP TSG-WG SA2 Meeting #154-AH-e *S2-23XXXXX***

**Janurary 16 – 20, 2023, Elbonia (revision of S2-2xxxxxx)**

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| *CR-Form-v12.2* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  | **23.502** | **CR** | **-** | **rev** | **-** | **Current version:** | **18.0.0** |  |
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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:*** | Procedures and services update for network exposure support for XR | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Tencent, Tencent Cloud | | | | | | | | | |
| ***Source to TSG:*** | SA2 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | XRM | | | | |  | ***Date:*** | | | 2022-12-05 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **B** |  | | | | | ***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 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:*** | | According to the conclusions of KI#3 in TR23.700-60, certain network information may be exposured to the XR applications via API or ECN marking. These related procedures and NEF/UPF services need to be updated in the related clauses. | | | | | | | | |
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| ***Summary of change:*** | | In clause 4.15.6.6, the procedure of interaction between the AF and NEF is updated to include the new parameters..  In clause 5.2.6.9.1, 5.2.6.9.2, 5.2.6.9.3, 5.2.6.9.5, the Nnef\_AFsessionWithQoS services are updated to include the new parameters for exposure.  In clause 5.2.26.2.1, Nupf\_EventExposure service is updated to include the new parameters for exposure. | | | | | | | | |
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| ***Consequences if not approved:*** | | The solution of XRM is incomplete. | | | | | | | | |
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| ***Clauses affected:*** | | Clause 4.15.6.6, 5.2.6.9.1, 5.2.6.9.2, 5.2.6.9.3, 5.2.6.9.5, 5.2.26.2.1 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | | **X** |  | Other core specifications | | | | TS 23.501 CR ...  TS 23.503 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 \* \* \* \*

#### 4.15.6.6 Setting up an AF session with required QoS procedure



Figure 4.15.6.6-1: Setting up an AF session with required QoS procedure

1. The AF sends a request to reserve resources for an AF session using Nnef\_AFsessionWithQoS\_Create request message (UE address, AF Identifier, Flow description(s) or External Application Identifier, QoS reference, QoS parameters, Alternative Service Requirements (as described in clause 6.1.3.22 of TS 23.503 [20]), DNN, S-NSSAI) to the NEF. Optionally, a period of time or a traffic volume for the requested QoS can be included in the AF request. The AF may, instead of a QoS Reference, provide the following individual QoS parameters: Requested 5GS Delay (optional), Requested Priority (optional), Requested Guaranteed Bitrate, Requested Maximum Bitrate. Regardless, whether the AF request is formulated using a QoS Reference or Individual QoS paramaters, the AF may also provide the following optional QoS parameters: flow direction, Burst Size, Burst Arrival Time at UE (uplink) or UPF (downlink), Periodicity, Time domain, Survival Time. When optional Alternative Service Requirements are provided by the AF request that is formulated with the help of Individual QoS parameters, a set of Alternative QoS Related parameters as in clause 6.1.3.22 of TS 23.503 [20] may be provided instead of a QoS Reference. The AF may provide the request for QoS monitoring report and congetion information exposure per QoS Flow as in clause 6.1.3.18 of TS 23.503 [20].

2. The NEF assigns a Transaction Reference ID to the Nnef\_AFsessionWithQoS\_Create request. The NEF authorizes the AF request and may apply policies to control the overall amount of QoS authorized for the AF. If the authorisation is not granted, all steps (except step 5) are skipped and the NEF replies to the AF with a Result value indicating that the authorisation failed.

3. The NEF determines whether to invoke the TSCTSF or to directly contact the PCF. This determination may use the set of individual QoS parameters or Alternative QoS Related Parameters from the AF. The determination may also use the AF identifier.

If the NEF determines not to invoke the TSCTSF, then steps 3, 4, 5, 6, 7, 8 are executed, otherwise, steps 3a, 3b, 4a, 4b, 5, 6a, 7a, 7b, 8 are executed.

If the NEF determines to contact the PCF directly without invoking the TSCTSF, the NEF uses the UE address to discover the PCF from the BSF. The NEF interacts with the PCF by triggering a Npcf\_PolicyAuthorization\_Create request and provides UE address, AF Identifier, Flow description(s), the individual QoS parameters, QoS Reference and the Alternative Service Requirements, QoS monitoring report or congestion information per QoS Flow to be measured. Any optionally received period of time or traffic volume is also included and mapped to sponsored data connectivity information (as defined in TS 23.503 [20]).

If the AF is considered to be trusted by the operator, the AF uses the Npcf\_PolicyAuthorization\_Create request message to interact directly with PCF to request reserving resources for an AF session.

3a. If the NEF determines to invoke the TSCTSF, the NEF forwards received individual QoS parameters, QoS references and Alternative QoS Related Parameter sets in the Ntsctsf\_QoSandTSCAssistance\_Create request message to the TSCTSF.

If the AF is considered to be trusted by the operator, the AF uses the Ntsctsf\_QoSandTSCAssistance\_Create request message to interact directly with TSCTSF to request reserving resources for an AF session.

A TSCTSF address may be locally configured (a single TSCTSF per DNN/S-NSSAI) in the NEF, PCF and trusted AF. Alternatively, the NEF uses the AF Identifier to determine the DNN/S-NSSAI and uses the DNN/S-NSSAI to discover the TSCTSF from the NRF.

3b. The TSCTSF determines whether it has an AF-session with a PCF for the given UE address. In this case the TSCTSF interacts with the PCF by triggering a Npcf\_PolicyAuthorization\_Create/Update request and provides UE address, AF Identifier, Flow description(s), the QoS Reference, Individual QoS Parameters and the Alternative Service Requirements. Any optionally received period of time or traffic volume is also included and mapped to sponsored data connectivity information (as defined in TS 23.203 [24]).

If the TSCTSF does not have an AF-session for a given UE address, the TSCTSF discovers the PCF, and TSCTSF sends the Requested PDB, the TSC Assistance Container, and other received individual QoS and Alternative QoS Related parameters to the PCF in Npcf\_PolicyAuthorization\_Create request message.

If the TSCTSF receives a Requested 5GS Delay and if the TSCTSF does not have the 5GS Bridge information for the AF-session, the TSCTSF can subscribe for the 5GS Bridge information from the PCF by triggering a Npcf\_PolicyAuthorization\_Create or Npcf\_PolicyAuthorization\_Subscribe request. The TSCTSF calculates a Requested PDB by subtracting the UE-DS-TT Residence Time (either provided by the PCF or pre-configured at TSCTSF) from the Requested 5GS Delay. If the TSCTSF receives any of the following individual QoS parameters: flow direction, Burst Arrival Time, Periodicity, Time domain, Survival Time from the NEF, the TSCTSF determines the TSC Assistance Container and sends it together with the Requested PDB, the TSC Assistance Container, and other received individual QoS parameters in the Npcf\_PolicyAuthorization\_Create/Update request to the PCF.

4. For requests received from the NEF in step 3, the PCF determines whether the request is authorized and notifies the NEF if the request is not authorized.

If the request is authorized, the PCF derives the required QoS parameters based on the information provided by the NEF and determines whether this QoS is allowed (according to the PCF configuration), and notifies the result to the NEF. In addition, if the Alternative Service Requirements are provided, the PCF derives the Alternative QoS parameter set(s) from the one or more QoS reference parameters or the Alternative QoS Related Parameter sets contained in the Alternative Service Requirements in the same prioritized order (as defined in clause 6.1.3.22 of TS 23.503 [20]). Furthermore, if the QoS monitoring and/or the congestion information report is requested, the PCF derives the PCC rules including the QoS monitoring request and/or the congestion information measurement request (as defined in clause 6.3.1 of TS 23.503 [20]).

If the AF is considered to be trusted by the operator, the PCF sends the Npcf\_PolicyAuthorization\_Create response message directly to AF.

NOTE 1: The PCF derived Alternative QoS parameter set(s) for the PCC rule are subsequently used to establish Alternative QoS Profile(s). The Alternative QoS Profile parameters provided to the NG-RAN are specified in clause 5.7.1.2a of TS 23.501 [2].

If the PCF determines that the SMF needs updated policy information, the PCF issues a Npcf\_SMPolicyControl\_UpdateNotify request with updated policy information about the PDU Session as described in the PCF initiated SM Policy Association Modification procedure in clause 4.16.5.2.

If the AF is considered to be trusted by the operator, the PCF sends the Npcf\_PolicyAuthorization\_Update response message directly to AF.

If the request is not authorized, or the required QoS is not allowed, NEF responds to the AF in step 5 with a Result value indicating the failure cause.

4a. For requests received from the TSCTSF in step 3b, the PCF determines whether the request is authorized and notifies the TSCTSF if the request is not authorized.

If the request is authorized, the PCF derives the required QoS parameters based on the information provided by the TSCTSF and determines whether this QoS is allowed (according to the PCF configuration), and notifies the result to the TSCTSF. In addition, if the Alternative Service Requirements are provided, the PCF derives the Alternative QoS parameter set(s) from the one or more QoS reference parameters, or Alternative QoS Related parameter sets (if provided) contained in the Alternative Service Requirements and Requested PDBs corresponding to the Alternative QoS Related parameter sets in the same prioritized order (as defined in clause 6.1.3.22 of TS 23.503 [20]).

If the PCF receives the individual QoS parameters instead of QoS Reference, the PCF sets the PDB and MDBV according to the received Requested PDB and Burst Size received from the TSCTSF. If the Requested PDB is not provided, the PCF determines the PDB that matches the QoS Reference. It also sets the GBR and MBR for the PCC rule according to requested values sent by the TSCTSF. The PCF may use the Requested Priority from the AF to determine Priority Level as defined in clause 5.7.3.3 of TS 23.501 [2]. TSCTSF specified Individual QoS Parameter values supersede default values for the 5QI.

If the PCF determines that the SMF needs updated policy information, the PCF issues a Npcf\_SMPolicyControl\_UpdateNotify request with updated policy information about the PDU Session as described in the PCF initiated SM Policy Association Modification procedure in clause 4.16.5.2. If the PCF receives a subscription for the 5GS Bridge information from the TSCTSF, if the PCF does not have the 5GS Bridge information for the PDU Session, the PCF uses the PCF initiated SM Policy Association Modification procedure as described in clause 4.16.5.2 to subscribe for 5GS Bridge information event from the SMF. Once the PCF has the 5GS Bridge information, the PCF notifies the TSCTSF for the 5GS Bridge information (including the UE-DS-TT Residence Time).

If the request is not authorized, or the required QoS is not allowed, TSCTSF responds to the NEF in step 4b with a Result value indicating the failure cause.

4b. The TSCTSF sends a Ntsctsf\_QoSandTSCAssistance\_Create response message (Transaction Reference ID, Result) to the NEF. Result indicates whether the request is granted or not.

If the AF is considered to be trusted by the operator, the TSCTSF sends the Ntsctsf\_QoSandTSCAssistance\_Create response message directly to AF.

5. The NEF sends a Nnef\_AFsessionWithQoS\_Create response message (Transaction Reference ID, Result) to the AF. Result indicates whether the request is granted or not.

6. The NEF shall send a Npcf\_PolicyAuthorization\_Subscribe message to the PCF to subscribe to notifications of Resource allocation status and may subscribe to other events described in clause 6.1.3.18 of TS 23.503 [20].

6a. The TSCTSF shall send a Npcf\_PolicyAuthorization\_Subscribe message to the PCF to subscribe to notifications of Resource allocation status and may subscribe to other events described in clause 6.1.3.18 of TS 23.503 [20].

7. When the event condition is met, e.g. that the establishment of the transmission resources corresponding to the QoS update succeeded or failed, the PCF sends Npcf\_PolicyAuthorization\_Notify message to the NEF notifying about the event.

If the AF is considered to be trusted by the operator, the PCF sends the Npcf\_PolicyAuthorization\_Notify message directly to AF.

7a. When the event condition is met, e.g. that the establishment of the transmission resources corresponding to the QoS update succeeded or failed, the PCF sends Npcf\_PolicyAuthorization\_Notify message to the TSCTSF notifying about the event.

7b. The TSCTSF sends Ntsctsf\_QoSandTSCAssistance\_Notify message with the event reported by the PCF to the NEF.

If the AF is considered to be trusted by the operator, the TSCTSF sends the Ntsctsf\_QoSandTSCAssistance\_Notify message directly to AF.

8. The NEF sends Nnef\_AFsessionWithQoS\_Notify message with the event reported by the PCF to the AF.

The AF may send Nnef\_AFsessionWithQoS\_Revoke request to NEF in order to revoke the AF request. The NEF authorizes the revoke request and triggers the Ntsctsf\_QoSandTSCAssistance\_Delete/Unsubscribe and/or Npcf\_PolicyAuthorization\_Delete and the Npcf\_PolicyAuthorization\_Unsubscribe operations for the AF request.

\* \* \* \* Second change \* \* \* \*

#### 5.2.6.9 Nnef\_AFsessionWithQoS service

##### 5.2.6.9.1 General

See clause 4.15.6.6.

This service is also used to support subscription and notification of QoS Monitoring for URLLC as described in clause 5.33.3.2 of TS 23.501 [2], and subscription and notification of network information for XR services, as described in clause 5.X.Y of TS 23.501 [2].

##### 5.2.6.9.2 Nnef\_AFsessionWithQoS\_Create service operation

**Service operation name:** Nnef\_AFsessionWithQoS Create

**Description:** The consumer requests the network to provide a specific QoS for an AF session.

**Inputs, Required:** AF Identifier, UE address (i.e. IP address or MAC address), Flow description(s) or External Application Identifier, QoS Reference.

**Inputs, Optional:** time period, traffic volume, Alternative Service Requirements (containing one or more QoS reference parameters in a prioritized order), QoS parameter(s) to be measured, congestion information to be measured, Reporting frequency, Target of reporting and optional an indication of local event notification as described in clause 6.1.3.21 of TS 23.503 [20], individual QoS parameters as described in clause 6.1.3.22 of TS 23.503 [20], DNN if available, S-NSSAI if available, Alternative QoS Related parameter sets.

**Outputs, Required:** Transaction Reference ID, result.

**Output (optional):** None.

##### 5.2.6.9.3 Nnef\_AFsessionWithQoS\_Notify service operation

**Service operation name:** Nnef\_AFsessionWithQoS Notify

**Description:** NEF reports the QoS Flow level event(s) to the consumer.

**Inputs, Required:** Reports of the events as defined in clause 6.1.3.18 of TS 23.503 [20].

**Inputs, Optional:** When the event report is for QoS Monitoring for URLLC, includes Packet delay for UL, DL, or round trip of the single UP path or two UP paths in the case of redundant transmission, as defined in clause 5.33.3.2 of TS 23.501 [2].

When the event report is for QoS Monitoring for XR service, includes data rate, round trip delay or delay different, as defined in clause 5.X.Y of TS 23.501 [2].

When the event report is for congestion information for XR service, includes the congestion information, as defined in clause 5.X.Y of TS 23.501 [2].

**Outputs, Required:** None.

**Output (optional):** None.

##### 5.2.6.9.5 Nnef\_AFsessionWithQoS\_Update service operation

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

**Description:** The consumer requests the network to update the Service Requirement(s) and/or additional Alternative Service Requirement(s) for an AF session.

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

**Inputs, Optional:** Flow description, QoS reference, time period, traffic volume, Alternative Service Requirements (containing one or more QoS reference parameters in a prioritized order), QoS parameter(s) to be measured, congestion information to be measured, Reporting frequency, Target of reporting and optional an indication of local event notification as described in clause 6.1.3.21 of TS 23.503 [20], individual QoS parameters as described in clause 6.1.3.22 of TS 23.503 [20], Alternative QoS Related parameter sets.

**Outputs, Required:** Result.

**Output (optional):** None.

\* \* \* \* Third change \* \* \* \*

#### 5.2.26.2 Nupf\_EventExposure Service

##### 5.2.26.2.1 General

**Service description:** This service can expose UPF related information to other NFs. There is one operation for this service:

- Notifying events on the PDU Session to the NFs.

The following events can be notified to a NF consumer:

- QoS Monitoring for URLLC: the event notification may contain the QoS Monitoring report as described in clause 5.33.3.2 of TS 23.501 [2].

The event notification may contain following information:

- QoS monitoring result e.g. end to end delay for specific QoS flow or for specific PDU session.

For XR services, the event notification may also contain following information:

- QoS monitoring result, e.g. data rate, round trip delay for multiple QoS flows, as defined in clause 5.X.Y of TS 23.501 [2]

- Congestion information per QoS flow for XR service as described in clause 5.X.Y of TS 23.501 [2].

\* \* \* \* End of changes \* \* \* \*