**3GPP TSG-WG SA2 Meeting #154-AH-e *S2-220xxxx***

**Elbonia, January 16 – 20, 2023 (revision of S2-220xxxx)**

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| *CR-Form-v12.2* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **23.503** | **CR** | **xxxx** | **rev** | **-** | **Current version:** | **18.0.0** |  |
|  | | | | | | | | |
| *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:*** | Removing ENs on PCF awareness of IWK | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Huawei, HiSilicon | | | | | | | | | |
| ***Source to TSG:*** | SA2 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | AMP | | | | |  | ***Date:*** | | | 2023-01-09 |
|  |  | | | |  | |  | | |  |
| ***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 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)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | The conclusion in TR23.700-89 agrees that, a validity period may be selected by PCF for a UE. But it is FFS whether the PCF knows whether the Authorized RFSP Index could indicate the UE to move from 5G to 4G. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | Remove the EN with clarification that the PCF is aware of interworking. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | Still FFS in the TS. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 6.1.2.1, 6.5 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **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 \* \* \* \*

#### 6.1.2.1 Access and mobility related policy control

The access and mobility related policy control encompasses the management of service area restrictions, the management of the RFSP Index, the management of the UE-AMBR, the management of the UE Slice-MBR and the management of the SMF selection. This clause defines the management of service area restrictions and RFSP Index for a UE registered over 3GPP access. The management of service area restrictions for a 5G-RG or a FN-CRG using W-5GAN are specified in TS 23.316 [27].

The management of service area restrictions enables the PCF of the serving PLMN (e.g. V-PCF in roaming case) to modify the service area restrictions used by AMF as described in clause 5.3.4 of TS 23.501 [2].

A UE's subscription may contain service area restrictions, which may be further modified by PCF based on operator defined policies at any time, either by expanding a list of allowed TAIs or by reducing a non-allowed TAIs or by increasing the maximum number of allowed TAIs. Operator defined policies in the PCF may depend on input data such as UE location, time of day, information provided by other NFs such as an AF request to change the service coverage, network analytics from NWDAF, etc.

The AMF may report the subscribed service area restrictions received from UDM during Registration procedure or when the AMF changed, the conditions for reporting are that local policies in the AMF indicate that access and mobility related policy control is enabled. The AMF reports the subscribed service area restrictions to the PCF also when the policy control request trigger for service area restrictions changes, as described in clause 6.1.2.5, is met. The AMF receives the modified service area restrictions from the PCF. The AMF stores them and then uses it to determine mobility restriction for a UE. The PCF may indicate to the AMF that there is an unlimited service area.

The service area restrictions consist of a list of allowed TAI(s) or a list of non-allowed TAI(s) and optionally the maximum number of allowed TAIs.

NOTE 1: The enforcement of the service area restrictions is performed by the UE, when the UE is in CM-IDLE state or in CM-CONNECTED state when in RRC Inactive, and in the RAN/AMF when the UE is in CM-CONNECTED state.

The management of the RFSP Index enables the PCF to modify the RFSP Index used by the AMF to perform radio resource management functionality as described in clause 5.3.4 of TS 23.501 [2]. The PCF modifies the RFSP Index based on operator policies that take into consideration e.g. accumulated usage, load level information per network slice instance, the indication that high throughput is desired for a specific application traffic or independently of the application in use and other information described in clause 6.1.1.3. The RFSP Index used by the AMF may be further adjusted by the PCF based on operator policies at any time.

The determination of the RFSP Index value requires to configure the PCF with the mapping of RAT Type and/or Frequency value to the RFSP Index that will be sent to RAN. If the PCF determines to modify the RFSP index value to indicate a change in priority from 5G access to E-UTRAN access for the UE in the case of mobility from 5GS to EPS, the PCF may, based on operator policy, include a RFSP Index in Use Validity Time of the RFSP Index.

Operator policies in the PCF may determine that the access and mobility related policy information (e.g. RFSP index value or service area restrictions) can change at the start and stop of an application traffic detection, at the start and stop of a SM Policy Association to a DNN and S-NSSAI, or immediately. In the former case, the PCF subscribes to the SMF for application traffic detection as described in clause 6.2.2.5. In addition, when the PCF evaluates that the access and mobility related policy information need any changes, the PCF reports it to the AF if the AF has subscribed to the notification on outcome of service area coverage change as defined in clause 6.1.3.18.

For radio resource management, the AMF may report the subscribed RFSP Index received from UDM during the Registration procedure or when the AMF changed. The conditions for reporting are that local policies in the AMF indicate that access and mobility related policy control is enabled. The AMF reports the subscribed RFSP Index to the PCF when the subscription to the RFSP Index change to the PCF is met. The AMF receives the modified RFSP Index from the PCF.

NOTE 2: The enforcement of the RFSP Index is performed in the RAN.

Upon change of AMF, the source AMF informs the PCF that the UE context was removed in the AMF in the case of inter-PLMN mobility.

The management of UE-AMBR enables the PCF to provide the UE-AMBR information to the AMF based on serving network policy. The AMF may report the subscribed UE-AMBR received from UDM. The conditions for reporting are that the PCF provided Policy Control Request Triggers the AMF to report subscribed UE-AMBR. The AMF receives the modified UE-AMBR from the PCF. The AMF provides a UE-AMBR value of the serving network to the RAN as specified in clause 5.7.2.6 of TS 23.501 [2].

The management of the SMF selection enables the PCF to instruct the AMF to contact the PCF during the PDU Session Establishment procedure to perform a DNN replacement, as specified in clause 5.6.1 of TS 23.501 [2]. To indicate the conditions to check whether to contact the PCF at PDU Session establishment (as specified in clause 6.1.2.5), the PCF provides the Policy Control Request Triggers SMF selection management and, if necessary Change of the Allowed NSSAI, together with SMF selection management related policy information (see clause 6.5) during UE Registration procedure and at establishment of the AM Policy Association.

The PCF may update the SMF selection management information based on a PCF local decision or upon being informed about a new Allowed NSSAI. The AMF applies the updated SMF selection management information to new PDU Sessions only, i.e. already established PDU Sessions are not affected.

The optional management of UE-Slice-MBR enables the PCF to modify the value in the list of Subscribed UE-Slice-MBR assigned to a SUPI based on serving network policies, if the HPLMN permits based on roaming agreement. The AMF reports the Subscribed UE-Slice-MBR for each S-NSSAI of the serving network. The S-NSSAI of the VPLMN is derived from the Subscribed S-NSSAI by the AMF and provided to the PCF. The AMF may provide the Subscribed S-NSSAI together with the S-NSSAI of the VPLMN. The conditions for reporting are defined in clause 6.1.2.5. The PCF returns the authorized UE-Slice-MBR for the S-NSSAI of the serving network. The AMF receives the authorized list of UE-Slice-MBR value for each S-NSSAI for which it has provided the Subscribed UE-Slice-MBR from the PCF. Then the AMF provides the authorized list of UE-Slice-MBR for the S-NSSAIs in the Allowed S-NSSAI to the RAN as specified in clause 5.7.1.10 of TS 23.501 [2].

The optional management of 5G access stratum time distribution enables the PCF for the UE to instruct the AMF about the 5G access stratum time distribution parameters, i.e., 5G access stratum time distribution indication (enable, disable). Optionally, when 5G access stratum time distribution or (g)PTP time synchronization is enabled, the PCF for the UE instructs the AMF about the Uu Time synchronization error budget.

In the case that the PCF for the UE (providing the access and mobility related policy information) and the PCF for the PDU Session of this UE (providing the Session Management related policies) are separate PCF instances, the following applies:

- If the PCF for the UE determines that the access and mobility related policy information can change at the start and stop of an application traffic detection, the following applies:

- The PCF for the UE may subscribes to be notified about the PCF binding information when a PCF for the PDU Session (of this UE) is registered in the BSF, including the SUPI, DNN, S-NSSAI. The DNN, S-NSSAI is either provided by the AF or locally configured in the PCF for certain Application Identifier(s). An alternative mechanism for the PCF for the UE to be notified of the PCF for the PDU Session of this UE is to request the AMF to send to the PCF for the PDU Session of the DNN, S-NSSAI, via SMF, the request for notification of SM Policy Association establishment. In this case, the PCF for the PDU Session should subscribe Request for notification on SM Policy Association establishment or termination Policy Control Request Trigger as described in clause 6.1.3.5 to get the binding information of PCF for the UE (as defined in clause 6.1.1.2.2).

- When the PCF for the UE is notified that PCF for the PDU Session is registered, either via the BSF that provides the UE address, DNN and the PCF address, PCF instance Id and PCF set id if available or via PCF for the PDU Session when it received a request for notification from the SMF. The PCF for the UE may subscribe to the "start/stop of application traffic detection" event defined in clause 6.1.3.18 or trigger a policy decision if there is a SM Policy Association to the DNN, S-NSSAI.

- The reporting of "start/stop of application traffic detection" to the PCF for the UE is used as input for a policy decision to change the access and mobility related policy information.

NOTE 3: The PCF for the UE may subscribe to the notifications of newly registered PCF for the PDU Session and subscribe to the "start/stop of application traffic detection" events for multiple applications with different application identifiers. When PCF receives the notifications for multiple applications, the PCF for the UE can determine which access and mobility related policy information to apply based on local configuration and operator policy.

- If the PCF for the UE determines that the access and mobility related policy information can change at the establishment and termination of a SM Policy Association to a DNN and S-NSSAI base on the notification sent by the BSF, the PCF may indicate to the BSF to report the registration of a PCF for the PDU Session when the first SM Policy Association is established and the deregistration of the PCF for the PDU Session when the last SM Policy Association is terminated for a DNN, S-NSSAI.

- The PCF for the UE checks if an AF is subscribed to be notified on outcome of service area coverage change, using the related event defined in clause 6.1.3.18.

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

## 6.5 Access and mobility related policy information

To enable the enforcement in the 5GC system of the access and mobility policy decisions made by the PCF for the control as described in clause 6.1.2.1, the 5GC system may provide the Access and mobility related policy information from the PCF to the AMF.

Table 6.5-1 lists the AMF access and mobility related policy information.

Table 6.5-1: Access and mobility related policy information

| Information name | Description | Category | PCF permitted to modify in a UE context in the AMF | Scope |
| --- | --- | --- | --- | --- |
| **Aggregated maximum bite rate** | *This part defines the aggregated maximum bite rate* |  |  |  |
| UE-AMBR | This defines the UE-AMBR value that applies for a UE | Conditional  (NOTE 5) | Yes | UE context |
| List of UE-Slice-MBR | This defines the List of UE-Slice-MBR (UL/DL) that each applies to the network slice of the UE. | Conditional  (NOTE 8) | Yes | UE context |
| **Service Area Restrictions** | *This part defines the service area restrictions* |  |  |  |
| List of allowed TAIs. | List of allowed TAIs  (NOTE 3) (NOTE 4). | Conditional  (NOTE 1) | Yes | UE context |
| List of non-allowed TAIs. | List of non-allowed TAIs  (NOTE 3). | Conditional  (NOTE 1) | Yes | UE context |
| Maximum number of allowed TAIs | The maximum number of allowed TAIs.  (NOTE 4) | Conditional  (NOTE 1) | Yes | UE context |
| **RFSP Index** | *This part defines the RFSP index related information* |  |  |  |
| RFSP Index for Allowed NSSAI | Defines the RFSP Index associated with Allowed NSSAI that applies for a UE | Conditional  (NOTE 2) | Yes | UE context |
| RFSP Index for Target NSSAI | Defines the RFSP Index associated with Target NSSAI that applies for a UE | Conditional  (NOTE 2) | Yes | UE context |
| RFSP Index in Use Validity Time | Defines the time by which the RFSP Index will be used in MME after 5GS to EPS mobility. | Conditional  (NOTE 2, NOTE 11) | Yes | UE context |
| **5G access stratum time distribution** | *This part defines the 5G access stratum time distribution* |  |  |  |
| 5G access stratum time distribution indication | Defines if 5G access stratum time distribution via Uu reference point is enabled or disabled | Conditional  (NOTE 9) | Yes | UE context |
| Uu interface time synchronization error budget | Indicates the Uu Time Synchronization error budget for 5G access stratum time distribution | Conditional  (NOTE 10) | Yes | UE context |
| **SMF selection management** | This part defines the SMF selection management instructions |  |  |  |
| DNN replacement of unsupported DNNs | Defines if a UE requested unsupported DNN is requested for replacement by PCF | Conditional  (NOTE 6) | Yes | UE context |
| List of S-NSSAIs | Defines the list of S-NSSAIs containing DNN candidates for replacement by PCF | Conditional  (NOTE 6)  (NOTE 7) | Yes | UE context |
| Per S-NSSAI: List of DNNs | Defines UE requested DNN candidates for replacement by PCF | Conditional  (NOTE 6) | Yes | UE context |
| NOTE 1: If management of service area restrictions by PCF is enabled.  NOTE 2: If management of RFSP index by PCF is enabled.  NOTE 3: Either the list of allowed TAIs or the list of non-allowed TAIs are provided by the PCF.  NOTE 4: Both the maximum number of allowed TAIs and the list of allowed TAIs may be sent by PCF.  NOTE 5: If management of UE-AMBR by PCF is enabled.  NOTE 6: If SMF selection management by PCF is enabled.  NOTE 7: The List of S-NSSAIs contains S-NSSAIs, valid in the serving network, of the Allowed NSSAI.  NOTE 8: If management of UE-Slice-MBR by PCF is enabled.  NOTE 9: If management of 5G access stratum time distribution is enabled.  NOTE 10: If 5G access stratum time distribution or (g)PTP time synchronization is enabled.  NOTE 11: If required based on operator policy when the RFSP index provided by the PCF indicates a change in priority from 5G access to E-UTRAN access in the case of mobility from 5GS to EPS. | | | | |

The *list of allowed TAIs* indicates the TAIs where the UE is allowed to be registered, see clause 5.3.4 of TS 23.501 [2] for the description on how AMF uses this information.

The *list of non-allowed TAIs* indicates the TAIs where the UE is not allowed to be registered, see clause 5.3.4 of TS 23.501 [2] for the description on how AMF uses this information.

The *Maximum number of allowed TAs* indicates the maximum number of allowed Tracking Areas, the list of TAI is defined in the AMF and not explicitly provided by the PCF.

The *RFSP Index for Allowed NSSAI* and *RFSP Index for Target NSSAI* defines the RFSP Index for radio resource management functionality.

*RFSP Index in Use Validity Time* defines the time for which the RFSP Index in use will be used in MME after 5GS to EPS mobility as specified in clause 5.17.2.2 of TS 23.501 [2].

The *UE-AMBR* limits the aggregated bit rate across all Non-GBR QoS Flows of a UE in the serving network.

The *list of UE-Slice-MBR* defines the list of authorized UE-Slice-MBR allocated for a UE, how it is enforced is described in clause 5.7.1.10 of TS 23.501 [2].

The *DNN replacement of unsupported DNNs* indicates that the AMF shall contact the PCF for replacement of an unsupported DNN requested by the UE.

The *List of S-NSSAIs* defines the S-NSSAIs, valid in the serving network, of the Allowed NSSAI that contain DNN candidates for replacement by PCF.

The *List of DNNs* defines the DNN candidates for which the AMF shall contact the PCF for replacement if such a DNN is requested by a UE.

The *5G access stratum time distribution* indicates the 5G access stratum time distribution parameters to be indicated to the NG-RAN via AMF.

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