**3GPP SA WG2 Meeting #153E**  **S2-22XXXXX**

**Elbonia, October 10-14, 2022 (was S2-22xxxx)**

**Source: Ericsson**

**Title: KI#4: Interim Conclusion**

**Document for: Discussion/Approval**

**Agenda Item: 9.14**

**Work Item / Release: FS\_eNS\_PH3**

*Abstract of the contribution: This contribution provides an interim conclusion for KI#4.*

# 1. Discussion

# 2. Proposal

It is proposed to accept the following changes to TR 23.700-741

**FIRST CHANGE**

### 8.X.4 Conclusion for KI#4

in the scope of this Key issues, two types of NSACF, i.e. the Primary NSACF and a NSACF, are identified. this of course does not mandate this type of deployment in general if an operator prefers the rel-17 architecture.

* The Primary NSACF handles overall NSAC for a S-NSSAI at the global level (i.e. it is ultimately responsible for the NSAC for a S-NSSAI.
* The Primary NSACF is always in the HPLMN in roaming case, or, in non roaming case, if NSAC service areas are deployed in the HPLMN, at a centralized location in the HPLMN.
* The central Primary NSACF registers its NF profile with the NRF by indicating the service area information as the global service Area. A consumer NF may utilise the NRF to discover the Primary NSACF for a S-NSSAI by using the serving area information set to "global".In roaming cases, the NSACF of the VPLMN interacts with the Primary NSACF located at the HPLMN for NSAC of the mapped S-NSSAI of the HPLMN and it is discovered by indicating "global" Service area information to the HPLMN NRF for the PLMN ID of the HPLMN.
* The NSACF for a S-NSSAI in a service area discovers the Primary NSACF in the PLMN if any by indicating the global service area for the same PLMN ID.
* A Primary NSACF can serve more than one PLMN ID when there are multiple equivalent HPLMNs
* The primary NSACF is responsible for configuring a local maximum number of UEs (or PDU sessions) greter than "0" in each NSACF it is in contact with, if it needs to delegate the admission to a NSACF (i.e. the NSACF can admit without contacting the primary NSACF if the current number of UEs or PDU sessions as applicable it has counted locally does not exceed the maximum numbers of UEs or PDU sessions as applicable).
* If no local maximum value is set at a NSACF, an implicit maximum value of "0" is assumed, unless a different value was agreed as part of a roaming agreement and configured by OA&M. If the Primary NSACF provides an updated value maximum this updates any value currently used at the NSACF.
* When a new UE or a new PDU session admission would cause the local maximum value to be overflown, the NSACF contacts the primary NSACF to perform the admission control.
* The primary NSACF can at any time update the maximum value of a NSACF during a UE or PDU session admission control transaction or a dedicated step.
* the Primary NSACF subscribes to updates from the NACFs that it is in contact with to obtain the local number of UEs or PDU sessions admitted at the NSACF. The primary NSACF can request to be updated when the local number is a certain set of percentages (e.g. 80%, 90%)of the local maximum value. The Primary NSACF uses this information to decide changes in local maximum values if needed.
* The NSACF subscribes with the Primary NSACF to obtain updated values of the local maximum independently from UE or PDU session admission transactions.
* If, when a NSACF requests a Primary NSACF whether a new UE or a new PDU session can be admitted (by indicating "increase"), if the UE or PDU session is Centrally Admitted and at the same time the Primary NSACF increases the local maximum value assigned to the NSACF, the NSACF stores the UE\_ID (and PDU session IDs as applicable) that was centrally admitted marked as "Loacally Admitted"
* If, when a NSACF requests a Primary NSACF whether a new UE or a new PDU session can be admitted (by indicating "increase"), if the UE or PDU session is Centrally Admitted without at the same time increasing the maximum value assigned to the NSACF, the Primary NSACF keeps a record of the NSACF where the admission is allowed and the NSACF stores the UE\_ID (and PDU session IDs as applicable) that was centrally admitted marked as "Centrally Admitted". Then, then the count of admitted UEs (or PDU sessions, as applicable) becomes lower than the local maximum of the NSACF, some of these UE\_IDs (and PDU session IDs as applicable) are no longer marked as "Centrally Admitted" and the NSACF indicates to the Primary NSACF the number of such UEs or sessions that are changed to "locally admitted" so the primary NSACF can increase the amount of the residual global number of UEs (or PDU sessions as applicable) it centrally manages correspondingly.
* at any time, in association with a UE/PDU session admission transaction or via a Notification, the Primary NSACF can indicate strict enforcement of admission at local level (i.e. no UE is admitted above the maximum value and the Primary NSACF is not contacted). The Primary NSACF may then later at any time indicate to remove this strict enforcement in association with a UE/PDU session admission transaction or via a Notification.

**Detailed description for NSAC for the maximum number of UEs**

The first time the NSACF is triggered to "increase" the number of registered UEs, if the NSACF has no local maximum value configured by OA&M or provided previously by the Primary NSACF, it forwards the increase request to the Primary NSCAF and it indicates the current value of local quota (i.e. nil). The primary NSACF may then admit the UE and also provide a local quota for the NSACF to handle without contacting the primary NSACF. The UE ID is stored at the NSACF as "Locally Admitted".

IF a NSACF needs to check whether to admit a UE, it checks if increasing the local number of admitted UEs locally causes the local maximum number of UEs to be exceeded. If not, the UE is admitted and the UE\_ID is added to a list of "Locally Admitted" UEs. If a NSACF detects the overflow of the local maximum number of UEs, it requests the Primary NSACF to handle the admission of the specific UE. If the UE is admitted by the Primary NSACF, unless the primary NSACF indicates the UE is admitted and the quota is increased at the NSACF, the UE-ID is stored at the NSACF as part of a list of UEs that were "Centrally Admitted", until the number of "locally admitted" UEs falls below the local maximum by a number sufficient to allows shifting these UE IDs to the list of "Locally Admitted" UEs. The NSACF updates the Primary NSACF with the number of "centrally admitted" UEs that have been moved to the locally admitted UEs list and the Primary NSACF increases the residual global quota by this number.

When a UE is admitted in centralized manner at Primary NSACF, the primary NSACF can at the same time provide a new local quota to the querying NSACF to minimize immediate future interactions, if residual global quota is available.

The Primary NSACF may also decide to not admit the UE if it has run out of residual global quota (e.g. even after attempting to reallocate local maximum values from other NSACF).

Upon change of Service area:

If the new NSACF has spare quota, it will admit the UE. Otherwise, it delegates the handling of the "increase" to the Primary NSACF as per usual handling described above. The Old NSACF in short order is updated with a decreased value the UE has moved away from the service area. By keeping a sufficiently big spare buffer the central NSACF can therefore ensure rejections are minimized when residual global quota is still available. The Primary NSACF takes care of rebalancing as needed across service areas, based on its policy. It can be optional to indicate to NSACF that the UE was already registered so the NSACF can admit the UE, trusting the quota from another NSACF will be decreased correspondingly. This can only be useful when also the centralized residual quota is exhausted and even a single UE admission can be centrally rejected.

**NSAC for the maximum number of PDU session**

Many of the considerations applicable above are replicated for this case also, only the identifiers of the unit of increase is the (UE\_ID, PDU session ID) pair. Also, the Primary NSACF supports the following capabilities:

- Providing a new updated local maximum number of PDU sessions for the local NSACF.

it is not necessary to indicate a PDU session is already admitted previously when SMF changes

**END OF CHANGES**