

Source:	Ericsson
Title:	Slice isolation with AMF reallocation via RAN
Document for:	Discussion
Agenda Item:	6.2
Work Item / Release:	5GS_Ph1 / Release 16

- The UE security context transfer issue, during NAS Registration Request reroute via RAN, has been discussed in SA3 #95-Bis and SA3#96. The latest LS in [S3-193197/S2-1908716](#) from SA3 suggested to use “well-connected” NF for rel-15, while solution study for rel-16 is still ongoing.
- SA2 #135 agreed that in rel-15, the security context transfer issue is solved by using direct communication between AMFs with the limitation that slice isolation deployment in the network can be impacted. CR [S2-1910722](#) for rel-15 is agreed with the 2 notes added in the TS 23.502:
 - *NOTE 2: The security context in the initial AMF is not transferred to the target AMF if initial AMF forward the NAS message to the target AMF via (R)AN. In this case the UE rejects the NAS message sent from target AMF as the security context in the UE and target AMF are not synchronized.*
 - *NOTE 3: Network slice isolation cannot be completely maintained in case the AMF reallocation is executed by step 7(A).*

Background and Status (2/2)

- SA2 #136 report on this topic (selected parts):
 - [S2-1911227](#) (Nokia, Nokia Shanghai Bell)
 - Rel-16 mirror CR 1892 for 23.502 (mirror of [S2-1910722](#)): Summary of change: To avoid the failures in the registration procedure with AMF reallocation option A is used if the Security has been established between the UE and initial AMF.
 - Approved with two objections from Ericsson and Qualcomm.

- SA #86 plenary outcome (selected parts)
 - [SP-191275](#) (slide 18 in paper from SA3 report) has the following info on AMF re-allocation:
 - For Rel-15: Agreement not to address the issue
 - For Rel-16: Issue for AMF re-allocation via RAN is pending progress in SA2

 - [SP-191058](#) (CR 1892 from SA2) has the following info:
 - It was explained that SA WG2 had decided to wait for SA WG3 information on this, but SA WG3 had not met to discuss this topic before November and SA WG2 had decided to endorse the CR assuming SA WG3 had no opinion. This was an unfortunate mis-communication. This CR Pack was postponed.

Proposed way forward

- SA2 to solve the issue at SA2#136AH (Jan 2020)
- Send the resolution to SA3#98 (10-14/2 Feb 2020) such that SA3 can confirm that the solution works from security perspective
- SA2 concludes the topic and sends CR(s) for approval from SA2#137 (24-28/2)



Discussion on the slice isolation and context transfer (1/2)

- In the current TS, “Change of slice”/”Slice redirection” can be achieved by 3 different variants: 1) via UE using UCU, 2) via RAN re-route and 3) via AMF using direct forwarding. These different methods can be used by operators to achieve different levels of slice separation/isolation.
- For the “via RAN re-route” method, it provides the possibility for the operator to achieve CN level separation/isolation (e.g. transport network isolation between slices can be applied) and in addition better RAN-CN transport network separation.
 - Via RAN re-route also achieves better load distribution on AMF inside a slice, based on logics/information provided through N2 interface.
- One example of isolation of resource through virtualization environment
 - TS 23.501 clause 5.6.12
 - “NOTE 1: a Network Instance can be defined e.g. to separate IP domains, e.g. when a UPF is connected to 5G-ANs in different IP domains, overlapping UE IP addresses assigned by multiple Data Networks, **transport network isolation** in the same PLMN, etc.”



- “Well-connected” NF, not part of a specific slice, recommended from SA3 is still a valid solution without impact at the UE side
- The most suitable “well-connected” NF and has relation to slice functionality is the NSSF, with the following consideration
 - The “Context transfer” is a separate service from the already defined services for NSSF
 - The “Context transfer” service can be co-allocated with any NF that it’s “well-connected” to different slices in the operator’s network.

Thank You!