RP-222433

Revision of RP-221594

3GPP TSG RAN #97
E-meeting, September 12-16, 2022

RAN work related to the new SA3 WI of the RRCResumeRequest Protection Enhancement

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Background | R18 SA3 WI

- The new SA3 R18 WID on *Security Enhancement on RRCResumeRequest Message Protection* was approved in June SA Plenary (SP-220538/S3-221185).
- The WI is to introduce the security enhancement for the RRCResumeRequest message protection and the RAN work (include RAN2 and RAN3) is required.

- **Observation**
  - **RAN work (incl. RAN2 and RAN3) is required for the new SA3 R18 WI.**

3 Justification

<SA3 WID: SP-220538/S3-221185>

Based on the agreed conclusion in TR 33.809, this WID is going to specify the normative details for enhancing RRCResumeRequest security.

4 Objective

The objective of this work item is to specify the security enhancements for protecting RRCResumeRequest messages, following the conclusion in TR 33.809. The objective includes the following:

- Security enhancement for protecting RRCResumeRequest messages, following the conclusion on the solution#17 in TR 33.809
  - Specify the enhancement on the source and target gNB/ng-eNB
  - Specify the enhancement on the UE to support the new RRCResumeRequest MAC-I
  - Specify the enhancement on the Xn interfaces between gNBs/ng-eNBs.

The expected output will be captured in TS 33.501

Any potential modification on RAN specs will be handled by RAN groups.

Background | RAN related discussion

- RAN2 discussed the solution in RAN2#115 meeting
  - It was triggered by the SA3 LS (S3-212349)

- In RAN2 LS reply (R2-2109121), RAN2 provides the feedback including the following info:
  - For the RAN impact, the analysis on detail is provided;
  - For the potential solution standardization, the solution is feasible and RAN plenary discussion is proposed since the solution spans multiple WGs.

- **Observations**
  - **According to previous RAN2 discussion, the solution in RAN side is feasible.**
  - **According to previous RAN2 discussion, RAN plenary should discuss how to start the RAN work for the new SA3 WI.**

<RAN2 LS Rely: R2-2109121>

1. Overall Description

RAN2 would like to thank SA3 for the LS on security protection on RRCResumeRequest message.

Regarding SA3's questions, following are the RAN2's feedback.

Q1: For the capability negotiation method between UE and gNB/ng-eNB as mentioned above, if there are other preferable alternatives from RAN2 perspective?

Q2: Is there any mechanism for the source gNB/ng-eNB to know the target gNB/ng-eNB capabilities?

[RAN2 response]

RAN2 discussed the capability negotiation methods and made the initial conclusion as follows:

- The feature requires the support of the UE, the source gNB and the target gNB;
- From UE perspective
  - The UE indicates its capability in the AS capability and reports to network via RRC signaling;
  - The UE enables the feature only when it knows both source node and target node support it;
- From the source node perspective
  - The source node indicates its capability via the RRC dedicated configuration (i.e. RRCRelease with SuspendConfig) or the SIB (depending on the method);
  - The source node only performs the new ResumeMAC-I verification when the UE is configured with the new feature and the target node supports the new ResumeMAC-I;
- From the target node perspective
  - The node as the target node role indicates its capability via SIB or binds its capability together with the source node's capability (depending on method);
  - How to indicate the target node's capability to the source node should be discussed in RAN3.

Q3: The possibility of specifying the solution in RAN2 specification in Rel-17 timeframe, if the solution is concluded by SA3.

[RAN2 response]

The solution is technically feasible from RAN2 perspective. However, RAN2 observed that the solution spans multiple WGs (i.e. RAN2 and RAN3), and thus it should be first discussed in RAN plenary if SA3 decides to specify it in R17.

2. Actions:

RAN2 respectfully asks SA3 to take the above information into account for future work.

Proposal for the RAN work of the SA3 Security Enhancement in R18

- It is proposed to reserve the R18 TU in RAN2 and RAN3 WG to specify the new R18 SA3 solution on *Security Enhancement on RRCResumeRequest Message Protection.*

- It is proposed to approve the new RAN WI to specify the SA3 solution on *Security Enhancement on RRCResumeRequest Message Protection.*
  - The RAN WI scope is to specify the UE and gNB operation and signaling according to SA3 design.
  - The RAN WI is started after the SA3 WI completion (i.e. start at February, 2023)
    - The SA3 WI is scheduled to close in December, 2022)

- **Proposal: RAN#97 to approve the new RAN WI on the RRCResumeRequest Protection Enhancement, and discuss the suggested TU allocation as below.**

WG	1Q'2023	2Q'2023		3Q'2023	4Q'2023	
RAN2	**0.5 TU** (RAN2#121)	**0.5 TU** (RAN2#121bis)	**0.5 TU** (RAN2#122)	**0.5 TU** (RAN2#123)	**0.5 TU** (RAN2#123bis)	**0.5 TU** (RAN2#124)
RAN3	**0.5 TU** (RAN3#119)	**0.5 TU** (RAN3#119bis)	**0.5 TU** (RAN3#120)	**0.5 TU** (RAN3#121)	**0.5 TU** (RAN3#121bis)	**0.5 TU** (RAN3#122)

  - NOTE: According to current RAN2 TU allocation indicated in the RP-213697, the reserved TUs are sufficient to complete the RAN WI on the RRCResumeRequest Protection Enhancement, and there is no impact to other approved WIs.

Proposed Objectives for the SA3 Security Enhancement in R18

- The WI targets to design the UE and RAN node behavior and signaling according to the SA3 design on *Security Enhancement on RRCResumeRequest Message Protection,*
  - The WI is RAN2-led and RAN3 is involved.

- **The proposed objectives**
  - **Objective 1:** Specify the enhancement on the UE to support the new RRCResumeRequest MAC-I calculation (RAN2)
    - E.g. UE capability design, Uu signaling design to enable/disable the feature, UE operation on the calculation of the new ResumeMAC-I/shortResumeMAC-I.
  - **Objective 2:** Specify the enhancement on the source and target nodes (RAN3)
    - E.g. the source and target node's capability design
  - **Objective 3:** Specify the enhancement on the Xn interfaces between source and the target nodes (RAN3)
    - E.g. the necessity and the methods of the exchange of the node's capability

ANNEX: Overview of current RAN2 TU allocation

- According to current RAN2 TU allocation indicated in the RP-213697, the reserved TUs are sufficient to complete the RAN WI on the RRCResumeRequest Protection Enhancement, and there is no impact to other approved WIs.

	TUs/Quarter						Total TUs
	3Q'2022	4Q'2022	1Q'2023	2Q'2023	3Q'2023	4Q'2023	
Topics	40	80	40	80	40	80	360
Nominal TUs for Maintenance	13	26	13	26	13	26	117
Additional TUs for Maintenance	12.5	13.5	2.75	2	0	0	30.75
Reserved TUs ([5%-15%] capacity)		6	3	6	3	8	26
Rel-18 TEIs				2	1	2	5
Misc. impacts from other RAN WGs and TSGs (incl MC Enh)	0.5	1	2	4	2	4	13.5
Mobility Enhancements	2	4	2	4	2	4	18
Enhancements for XR	2	4	2	4	2	4	18
Sidelink Relay Enhancements	1	3	1.5	3	1.5	3	13
NTN (Non-Terrestrial Networks) evolution - NR	1	2	1	2	1	2	9
NTN (Non-Terrestrial Networks) evolution - IoT	1	2	1	2	1	2	9
UAV (Uncrewed Aerial Vehicle)	0.5	1	0.5	2	1	2	7
Multiple SIM (MUSIM) Enhancements		1		1	1	2	5
In-Device Co-existence (IDC) Enhancements	1	1	1	1			4
Small data		0.5	0.5	0.5	0.5		2
MBS	0.5	1	0.75	1.5	0.75	1	5.5
NR-MIMO Evolution				1	0.75	1.5	3.25
Further UL coverage enhancement				1	0.5	1	2.5
Smart Repeater	0.5	1	0.5				2
NR Sidelink Evolution		1	1	2	1	2	7
Positioning Evolution	1.5	4	2	4	2	4	17.5
RedCap Evolution			1	2	1	2	6
Low power WUS				1	0.5	1	2.5
AI/ML - Air Interface		2	1	2	1	2	8
Network energy savings	1	2	1	2	1	2	9
Additional topological improvements – IAB/VMR	0.5	1	0.5	1	0.5	1	4.5
SON/MDT Enhancements	1	2	1	1.5	1	2	8.5
QoE Enhancements	0.5	1	1	1.5	1	1.5	6.5
Leftover	0	0	0	0	0	0	0

	RAN1-led		RAN2-led		RAN3-led	
	WI		SI			

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