**3GPP TSG-WG SA2 Meeting #142E *S2-2008569r03***

**Elbonia, November 16 – 20, 2020 (revision of S2-20xxxx)**

**Source: Qualcomm Incorporated**

**Title: Conclusion for Key issue #1**

**Document for: Approval**

**Agenda Item: 8.10**

**Work Item / Release: FS\_MUSIM / Rel-17**

*Abstract: This contribution proposes the discussion and conclusion about Busy Indication.*

# 1. Discussion

One of the controversial issue for KI#1 is about the use of Busy indication. There are two aspects are not concluded, one is whether use RRC-based Busy Indication or NAS-based Busy Indication solution should be selected. The other aspect is whether UE shall / should/ may/ or using best effort send the Busy Indication.

## 1.1 RRC Busy Indication VS NAS Busy Indication

SA3 in LS response S3-202687 indicated:

“SA3 answer: Sending an unsecured busy indication in an RRC message is a security risk. This need to be avoided.”

For UE in RRC\_Inactive mode paging is performed from NG-RAN, UE can send the indication within message 4 which is ciphered message. There is no security issue and RAN can make the details about the procedure.

**Proposal 1**: RRC-based Busy Indication can be used for UE in RRC\_Inactive mode, RAN will decide the procedure.

## 1.2 UE shall /may send the Busy Indication

For UE in RRC\_IDLE mode, since there is no security context in the RAN the RRC-based Busy Indication is not possible according to the LS S3-202687 due to afore mentioned security issue. According to the NAS-based solution that proposed in Solution#3, UE shall initiate the Idle to Active mode Service request procedure and as the result of that 5G-GUTI reallocation procedure shall also be performed as is required in 5GS. The whole procedure requires hundreds of miniseconds which is a big interruption for the activated service in other USIM.

**Observation 1:** UE is not able to always send Busy Indication due to long interruption for the activated service in other USIM.

According to the current NAS spec in TS 24.501, UE shall send paging response after receiving paging request for a single USIM UE. But for MUSIM UE, due to the long interruption of paging response that described as above, it is impossible for MUSIM UE to response paging everytime.

*The UE shall invoke the service request procedure when:*

*a) the UE, in 5GMM-IDLE mode over 3GPP access, receives a paging request from the network;*

In real world current implementations in order to avoid bad service performance of the activated service and not violate TS 24.501, there were several UE based implementation optimization, e.g., if UE is activated due to voice, MUSIM UE will not turn away to listen paging in other USIM, then UE will never receive paging for other USIM during the voice session activation period.

One of the advantages of MUSIM in Rel-17 is that UE can decide whether accept paging or not based on paging cause, that means UE shall always listen paging and therefore can not use the current implementation as before. But if it is approved that UE shall always respond to paging with Busy indication in order to comply to TS 24.501, it is obvious that there is a contradiction between activated service performance for one USIM and the Busy Indication for the other USIM. If UE is anticipated to always listen paging and make the decision based on paging cause, we should find a tradeoff between the service performance which should be kept on par with existing implementations and compliance to TS 24.501. Some company proposed UE should send Busy Indication is also too strict for the UE.

Therefore, it is more appropriate to conclude that UE may send NAS Busy Indication, it is more flexible for the UE to decide to send Busy Indciation based on different scenarios.

**Proposal 2**: It is more flexible and realistic to conclude that UE sending a NAS Busy Indication after receiving paging message is kept optional.

According to the above analysis, the following proposals are proposed as KI#1 conclusion.

This paper also proposed multiple paging cause as a conclusion for KI#1.

# 2. Proposal

\* \* \* \* Start of Changes \* \* \* \*

## 8.1 Conclusions for Key Issue #1: Handling of Mobile Terminated service with Multi-USIM device

The following **interim** conclusions are agreed for the baseline functionality:

Editor's note: These are interim conclusions. Additional solution principles can still be proposed for the final conclusions.

Editor's note: Whether and which Paging Cause(s) will be pursued to conclusions will be determined in SA2#142E taking into account feedback from RAN WG2, RAN WG3 and SA WG3.

Editor's note: One or more Paging Causes under consideration are:

 One Paging Cause: MMTel Voice or Important service. Whether an additional Paging Cause is needed to differentiate a supporting RAN from a non-supporting RAN is FFS.

 Multiple Paging Causes: MMTel Voice, MMTel Video, SIP Signalling, NAS Signalling, SMS over NAS Signalling and Other data are considered.

Editor's note: It will be determined whether the Paging Cause(s) is(are) applied 1) only for UEs with the request, i.e. the UEs that have MUSIM capability and have multiple USIMs, etc, or 2) to all UEs indiscriminately.

Editor's note: According to the conclusion in KI#3, upon NAS-level leaving the UE may provide assistance information including information to temporarily restrict/filter MT data in this network while the UE has left. Whether UE is allowed to provide information to temporarily restrict/filter MT data in other circumstances is FFS.

- If a UE determines it can respond to paging in Network A for the foreseeable future,

 - If Multi-USIM device received paging by Network-A in RRC\_Idle mode and the device decides to accept the paging, UE shall perform as existing procedure (send the Service Request message).

- If Multi-USIM device received paging by Network-A in RRC\_Idle mode and the device decides not to accept the paging, UE shall attempt to send a BUSY Indication via NAS message to network (to be further discussed in normative phase).

- In this state the UE is assumed to be able to perform Tracking area/Reguistration updates.

- If a UE determines, to avoid performace degradation on network B, it cannot respond to paging in Network A for the foreseeable future, it indicates to Network A to not be paged and also stops listening to paging in Network A

- In this state the UE cannot be assumed to be able to perform Tracking area/Reguistration updates.

Editor's Note: more details on Paging response behaviour are to be discussed in normative phase.

 NOTE X1: Whether Busy indication is supported for RRC\_Inactive case is up to RAN decision.

- The UE MMI shall not require input from the user in order for the UE to decide whether to respond to paging.

\* \* \* \* End of Changes \* \* \* \*