

Agenda Item: 10.4.1.6.5

Source: ASUSTeK

Title: Discussion on On-demand system information request in NR

Document for: Discussion and Decision

1. INTRODUCTION

Agreements

1 Only progress on the two agreed approaches for delivering on-demand system information (via dedicated signalling to RRC_CONNECTED UEs; via SI-Message broadcast to RRC_IDLE and RRC_INACTIVE UEs) and refrain from introducing additional solution variants.

Agreements for Msg3 based SI request method:

1. UE determines successful Msg3 based on reception of Msg4
FFS Details of the Msg4 content used to confirm successful Msg3. To be discussed initially CP.
2. Preamble(s) for SI request using Msg3 based Method are not reserved.
3. RRC signaling is used for SI request in Msg3.
FFS: RRC signaling how to indicate the requested SI/SIB details left to ASN.1 work.
4. Temporary C-RNTI received in Msg2 is used for Msg4 reception

In this contribution, we discuss Msg3 based System information request and system information request for RRC_CONNECTED UE.

2. DISCUSSION

Based on current agreement, the possible steps for Msg3 based system information request are shown in Figure 1.

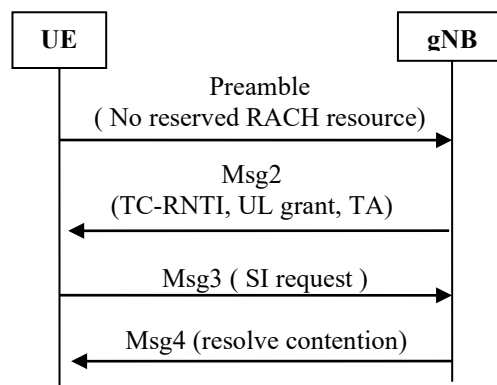


Figure .1 Msg3 based system information request procedure

When a UE in RRC_IDLE/in RRC_INACTIVE wants to request system information, the UE will need to check whether the system information is associated with special PRACH. If not, the UE will transmit a SI request through the Msg3 in a random access procedure. Moreover, the system information request message should be transmitted through SRB0 (i.e. CCCH message) due to the UE's state. And the system information request will need to include UE identity for resolving the contention. Moreover, the UE has no need to set the Temporary C-RNTI as C-RNTI in such case. On the other hand, it is reasonable for UE in RRC_CONNECTED state to reuse the system information request message in Msg3 based SI request.

Proposal 1: For Msg3 based SI request, a UE in RRC_IDLE/RRC_INACTIVE transmits a system information request message containing a UE identity through SRB0.

Proposal 2: The system information request message in Msg3 based SI request method will also be used by UE in RRC_CONNECTED mode.

In general, if UE wants to transmit a RRC message, the UE may either use received uplink grant or need to derive uplink resource through SR procedure or random access procedure. When the UE uses a dedicated uplink grant for transmitting the system information request message, the gNB will forward system information to the UE through DL assignment addressed to the UE's C-RNTI. In such case, it is obvious that the system information request has no need to include an UE identity.

Observation 1: A UE in RRC_CONNECTED mode has no need to include a UE identity into the system information request message when the UE uses a dedicated uplink grant to transmit the system information request message.

Regarding SR case, if the UE could trigger a SR for the system information request, then the UE will receive a dedicated uplink grant for transmitting the system information request message. And the gNB will forward system information to the UE through DL assignment addressed to the UE's C-RNTI. And the system information request also has no need to include an UE identity in this case. However, it is not clear whether the SR will be triggered if the system information request is transmitted through CCCH. There is no association between the CCCH and SR configuration.

On the other hand, regarding RA case, the UE in RRC_CONNECTED will perform a random access procedure similar to the Msg3 based SI request method performed by the UE in RRC_IDLE/RRC_INACTIVE. One main difference would be the UE in RRC_CONNECTED already has C-RNTI. In such case, since the UE transmits the system information request message through SRB0 (CCCH), the C-RNTI MAC CE would not be included based on LTE RA design (Baseline). It will force UE in RRC_CONNECTED state to resolve contention based on other identity included in the system information request message. And it also makes condition for whether to include UE identity into system information message more complex. Here are two possible options proposed for UE in RRC_CONNECTED to decide the contents in system information request message.

Option 1: A UE in RRC_CONNECTED transmits the system information request message through SRB1 (DCCH). And no UE identity will be included into system information request message.

Option 2: A UE in RRC_CONNECTED decides whether to include UE identity (e.g. S-TMSI or C-RNTI) into system information request message based on whether the UE has PUCCH resource configured for CCCH.

In most of cases, the two options could avoid UE including UE identity in SR forwarding case, while allow UE to include UE identity for RA forwarding case. In option 1, the UE identity will be included as C-RNTI MAC CE for RA forwarding case. In option 2, the UE identity will be included as information element for RA forwarding case. Comparing the two options, the option 1 will have less specification impact and can solve the concern mentioned in SR case at the same time. We prefer to use Option 1 for handling contents of system information request message transmitted by UE in RRC_CONNECTED.

Proposal 3: A UE in RRC_CONNECTED transmits a system information request message containing no UE identity through SRB1.

3. CONCLUSION

In this contribution, we propose the following:

Proposal 1: For Msg3 based SI request, a UE in RRC_IDLE/RRC_INACTIVE transmits a system information request message containing a UE identity through SRB0.

Proposal 2: The system information request message in Msg3 based SI request method will also be used by UE in RRC_CONNECTED mode.

Proposal 3: A UE in RRC_CONNECTED transmits a system information request message containing no UE identity through SRB1.

4. REFERENCE

[1] RAN2 98 Chairman's note

[2] RAN2 Adhoc2 Chairman's note