

Agenda Item: 10.4.1.6.6
Source: Huawei, HiSilicon
Title: Failure handling for on-demand SI acquisition
Document for: Discussion and decision

1 Introduction

In RAN2 AH#2 meeting, the following agreements are achieved for MSG1 and MSG3 based on-demand SI request:

- Agreements for Msg1 based SI request method:
- 1: RAPID is included in Msg2.
 - 2: Fields Timing Alignment Information, UL grant and Temporary C-RNTI are not included in Msg2.
 - 3: RACH procedure for SI requests is considered successful when Msg2 containing a RAPID corresponding to the transmitted preamble is received.
 - 4: Msg2 reception uses RA-RNTI that corresponds to the Msg1 transmitted by the UE (details of RA-RNTI selection left to UP discussion)
 - 5: UE retransmits RACH preamble according to NR RACH power ramping
 - 6: Msg1 for SI request re-transmission is continued until reaching max preamble transmissions. Thereafter, a Random Access problem to upper layers is indicated. (depending on the NR RACH procedure design)
- FFS: Upper layer actions when MAC reports Random Access problem. To be discussed in CP session.
- 7: Back off is applicable for Msg1 based SI requests but no special Back off subheader/procedure is required.

- 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 signalling is used for SI request in Msg3.
- FFS: RRC signalling how to indicate the requested SI/SIB details left to ASN.1 work.
- 5: Temporary C-RNTI received in Msg2 is used for Msg4 reception

In RAN2 99 meeting, the following agreements are achieved for MSG1 based on-demand SI request:

- Agreements
1. RRC triggers MAC to initiate Random Access procedure for the purpose of SI-request. For the case of msg1-based request procedure RRC indicates to MAC the PRACH preamble/resource.
 2. For msg. 1-based SI request MAC indicates to RRC the reception of acknowledgement for SI request
 3. The UE is not expected to perform multiple msg.1-based SI request RA procedures simultaneously. A single msg.1-based SI request will be performed at a time.
 4. For msg1-based request procedure, the RACH msg2 contains only the MAC PDU subheader for a RAR containing the Random Access Preamble ID field acknowledging the received PRACH SI preamble.

As shown above, how to send the SI request via MSG1 or MSG and how to receive corresponding SIBs were discussed in previous meetings. But how to perform failure handing in case SI has not been discussed yet. So this paper provides design for failure handling of SI request especially for MSG3 based SI request.

2 Failure handing in case SI is not received

It was previously agreed to use retransmissions in the case of MSG1 transmission failure. But for MSG3 based SI request, if the corresponding SI request response (i.e. MSG4) is not received during configured monitoring time, how to handle it was not discussed yet.

In this case, LTE procedure for contention resolution failure can be re-used. Under such procedure, if the maximum SI request number is not reached, HARQ buffer for MSG3 is flushed, PREAMBLE_TRANSMISSION_COUNTER is incremented by 1 and MSG1 is transmitted to deprive resource for SI request (MSG3). The power ramping can be applied according to NR RACH power ramping as MSG1 based mechanism.

Proposal 1: For MSG3 based SI request, if SI request response (i.e. MSG4) is not received, and the maximum SI request number is not reached, re-use LTE procedure for contention resolution failure in order to retry Msg3 transmission (i.e. flush HARQ buffer, increment preamble transmission counter, etc.).

For each SI request, a maximum SI request number should be defined. For MSG1 based request, the maximum SI request number can follow the normal RACH procedure. For MSG3 based SI request, the maximum SI request number for MSG3 based SI request should be configured in minimum SI. If SI request reaches the maximum number, the on-demand SI request shall be considered failed, the UE behaviour of failure of on-demand SI request may be different depending on whether the requested SI impacts the service or not. If the requested on-demand SI doesn't prevent the UE from using regular services, UE can just label the SI as not available in the cell and mark the function as unavailable. Otherwise, cell reselection can be triggered when the request of SI reaches the maximum number.

Proposal 2: A maximum SI request number and monitoring time duration should be included in minimum SI for MSG3 based SI request.

Proposal 3: If SI request reaches the maximum number, the UE can label the SI as not available in the cell or trigger cell reselection.

2 Conclusion

In this paper, we discuss the design for connected mode SI request and have the following proposals:

Proposal 1: For MSG3 based SI request, if SI request response (i.e. MSG4) is not received, and the maximum SI request number is not reached, re-use LTE procedure for contention resolution failure in order to retry Msg3 transmission (i.e. flush HARQ buffer, increment preamble transmission counter, etc.).

Proposal 2: A maximum SI request number and monitoring time duration should be included in minimum SI for MSG3 based SI request.

Proposal 3: If SI request reaches the maximum number, the UE can label the SI as not available in the cell or trigger cell reselection.

3 Reference

- [1] 3GPP RAN2 AH2, Chairman's note, June, 2017.
- [2] 3GPP RAN2#99, Chairman's note, August, 2017.