3GPP TSG-RAN WG2 Meeting #109-e R2-200xxxx

Electronic Meeting, 24th February – 6th March 2020

Agenda: 6.21

Source: Ericsson

Title: On-demand SIB in CONNECTED Functionality

Document for: Discussion, Decision

# 1 Introduction

This document is to kick off the following email discussion:

* [AT109e][082][OdSIBconn] on-demand SIB in CONNECTED Functionality (Ericsson)

 Scope: Treat and progress based on R2-2001670

 Intended outcome:

 Deadline: MAR 4

# 2 Summary of remaining issues

## Issue 2.1 On-demand request of SIB9 and others

One issues regarding which SIBs can be requested on-demand while in CONNECTED, is brought up by Ericsson. What is claimed is that in the DCCA WI, it was decided to have a separate SIB for delivering the early measurement configuration to all UEs under the coverage of the same cell.

* The UE shall not request on-demand the SIB specified in the DCCA WI for early measurements. [6] (Ericsson)

Since whether to configure early measurement or not is a network choice, it should be quite straightforward to not allow the UE to request the new SIB specified in the DCCA WI on-demand. Therefore, what we suggest is:

1. The UE shall not request on-demand the SIB specified in the DCCA WI for early measurements.

Q1: Do companies agree with Proposal 1?

|  |  |  |
| --- | --- | --- |
| Company | Yes/No | Comment |
| Samsung |  | The proposal can be discussed together with other Rel-16 SIBs which can be requested on-demand or not. No need to discuss in isolation |
| Ericsson | Yes | Since the new SIB specified in the DCCA WI is related to the configuration of early measurement, we not see the benefit for the UE to request this on-demand. It should be a network choice, indeed, to configure early measurements or not. |
| Futurewei | Yes | Similar principle can be applied when other R16 SIBs are considered for on-demand request. |
| NEC | Yes | The DCCA function should be under network control, so no need for the requst by the UE |
| MediaTek | Yes | Our understanding is that the new SIB from the DC/CA WI is for use in RRC\_IDLE/RRC\_INACTIVE anyway, so it is not needed to request it in RRC\_CONNECTED. The UE may need to request it in idle/inactive mode, but we understand the intention of the proposal is not to exclude this—it should be reworded to say “The UE in RRC\_CONNECTED shall not request on-demand the SIB specified in the DCCA WI for early measurements.” |
| Nokia | No | Early measurements are used only in IDLE/INACTIVE mode, but UE does know whether the cell in question utilizes them from SIB1 indication. However, we are not sure if we need to restrict the procedures as such exceptions only create difficulties later on if it is found that there would be use for the SIBs after all. It would be simplest to allow this, as UE has almost no benefit from requesting the SIB anyway since it will only use the measurements if provided with the early measurement configuration in RRCRelease |
| LG |  | Our understanding is that UE will not request the early measurement related SIB though the request is allowed. Even if UE requests the early measurement related SIB, it is NW implementation whether to provide the requested SIB or not. So we cannot find any clear reason to define such a restriction for the SIB. |
| Intel | Yes |  |
| ZTE | Yes | Should up to network to decide whether to configure early measurements or not. |
| CATT | Yes | For other R16 WIs, we also need to discuss whether the SIBs specified in other WIs are necessary to be requested by on-demand in connected mode. |
| OPPO | Yes  | Currently we also can not see the necessary to read the new SIB specified for CADC WI. But we are not sure if there is this requirement in the future.  |
| Lenovo | Yes | We don’t see any use-case for requesting early measurement configuration SIB in connected mode. |
| Huawei | Yes | DCCA SIB for early measurement is for IDLE/INACTIVE UE. No need to request them for the UE in RRC\_CONNECTED |
| Apple | Yes | The early measurement SIB is only for UE in idle/inactive. |
| QCOM | Yes | No need to include  |

**Rapporteur input**: According to the input provided by companies, 8 out of 11 companies think that the SIBx specified in the DCCA WI should not be requested on-demand as this is only used for configuring the UE with early measurements. Since whether configuring measurements or not is a network choice, there is not much value for the UE to request this SIB on-demand. On top of this, in the online session we already agreed that we will allow to request on-demand only those SIBs that are really needed (even if the extension possibility should be guaranteed from the ASN.1 point of view). Therefore our suggestion is the following:

1. The UE shall not request on-demand the SIB specified in the DCCA WI for early measurements.

## Issue 2.2 Configurability of on-demand SIB in CONNECTED

According to what has been discussed during the email discussion [108#61][R16] and the Online discussion, one issue was whether the NW should use a flag to enable/disable the on-demand SIB feature on the UE-side. Regarding this topics, three options are currently on the table:

1. Explicit network indication (other than *si-broadcaststatus* bit) is not needed to inform the UE whether the on-demand SIB request in RRC\_CONNECTED is supported.
2. Explicit indication is needed for Rel-16 On-demand SI procedure in RRC\_CONNECTED is an optional feature for the network and independent from the On-demand SI procedure in RRC\_IDLE/RRC\_INACTIVE.
3. Explicit indication is needed for Rel-16 On-demand SI procedure in RRC\_CONNECTED but only if SIB9 can be requested on-demand.

According to this, we would like to ask companies their view on which option should be pursued for a possible agreement.

Q2: Which Option should be pursued regarding the configurability of On-demand SIB in CONNECTED?

|  |  |  |
| --- | --- | --- |
| Company | Option | Comment |
| Samsung | Option 1 | Rel-15 OSI feature for IDLE/INACTIVE UEs is optional feature for the Network. This is based on the si-broadcaststatus bit in SIB1. We are wondering why companies think this existing bit cannot be reused for OSI feature in Connected. UE in Connected anyway have to read schedulinginfo to determine what SIBs are broadcasted and what are not broadcasted.Assuming Option2 is pursued and new bit is introduced then following 4 cases are possible:Case1: Broadcast bit indicates ‘broadcasting’ and new indication is set FALSECase2: Broadcast bit indicates ‘broadcasting’ and new indication is set TRUEFor above cases UE is not allowed to send SI request, when UE is configured with CSS.Case3: Broadcast bit indicates ‘notbroadcasting’ and new indication is set TRUEFor Case3 UE is allowed to send SI request, when UE is configured with CSS.Case4: Broadcast bit indicates ‘notbroadcasting’ and new indication is set FALSEIn this case UE can neither acquire required SIB from broadcast nor send SI request. NW shall perform unsolicited delivery of the required SIB to the UE in dedicated manner. Such NW requirement will be required to be specified explicitly in the specification. Is this acceptable to NW vendors ?For Case1, the UE which does not have CSS configured will not be allowed to send SI request. In such case NW shall perform unsolicited delivery of the required SIB to the UE in dedicated manner Such NW requirement will be required to be specified explicitly in the specification. Is this acceptable to NW vendors ?We fail to understand the justification for Option 2.With Option 1 such problems do not exist.UE which does not have CSS configured shall be always allowed to send SI request regardless of the setting of broadcast bit and in normal conditions it is expected NW reply to the UE request. This is much simple and clean approach rather than specifying Option2 which cannot be justified and unnecessary specifying NW requirements.Option3 is a separate discussion and should be discussed in this context. There are other ways for delivery of the reference timing information |
| Ericsson | Option 2 or Option 3 | In general, we prefer to go for Option 2 as we do not see the benefit to have this feature mandatory for the network. Since the on-demand feature for IDLE/INACTIVE is completely different from the one for CONNECTED, one cannot assume that a gNB would support both of them. |
| Futurewei | Option 1 | The support of on-demand SI should be optional to network, and there is no need of having different means to indicate it for Idle/Inactive and Connected UEs. Whether a particular SI should be requested by Idle/Inactive or Connected UE is determined by the related functionality and should already be clear to UE. |
| NEC | Option 3 or 2 (with clarification) | we want to clarify the Option 2. According to on-line discussion, we are confused with this explicit indication. We understood this is one bit per cell (not per SIB), becuase this indication is to show the network support of On-demand SI in connected. Then, we thought this can be done by legacy mechanism for Rel-16 (or later) SIB, i.e. si-BroadcastStatus. However, it seems some companies conider this explicit indication is used to differentiate the Idle/Inactive UE from the Connected UE. E.g., Connected UEs are allowed to send a request, but Idle/Inactive UEs are not acc. to Ericssion comment online. If this is the intention, we can agree but want to confirme whether it is really the intention and can be justified? Otherwise, the Option 3 is sufficient. |
| MediaTek | Option 1 if acceptable to network vendors; otherwise option 2 | Basically, we think the UE needs to know if it can usefully request the SIB.We think Samsung correctly identify the four cases that can occur. The conclusion we draw from that analysis is that if a Rel-16 network does not support on-demand SI request in connected mode, operations that depend on a SIB in connected mode may fail, unless the network undertakes to deliver the concerned SIB to every UE that might need it (e.g., even if the SIB is broadcasted, all UEs that support the related feature and do not have a CSS configured would need to receive it by dedicated signalling, and if the request mechanism is not supported, the network has to be responsible for delivering the SIB to them).If network vendors can accept having the feature be mandatory on the network, this avoids spec complexity. Failing that, we think option 2 is needed, so that the UE can know if it faces a network that will not deliver the SI on-demand, and the UE can fail the concerned procedure immediately instead of making a futile request for the SIB. |
| Nokia | Option 2 | We agree with Ericsson. We consider the OSI in connected is an independent feature and the NW indication as a feature support indicator and this is required because of the fact that Rel-15 gNBs will not support OSI in connected feature.  |
| LG | Option2 or 3 |  |
| Intel | Option 3 | Firstly on the general principle, UE should know if network supports on-demand in connected mode for a SIB before it can request it.Based on discussions, now we think option 3 is better and option 2 may not be a generic solution that can handle all future scenarios.We agree with Samsung that if ondemand in commented for SIB9 is not required, the indication is not needed and option 2 is not needed. |
| ZTE | Option 2 | Agree with Ericsson and Nokia that supporting on demand SI in connected should not be mandatory for network.As shown in the following table, the expected UE behavior is different when NW allow or not allow on demand SI request in connected.

|  |  |  |  |
| --- | --- | --- | --- |
| NW configuration | UE in idle/inactive | UE in connected configured with CSS | UE in connected not configured with CSS |
| Case1: si-BroadcastStatus=broadcastingOndemandinconnected=not support | / | / | / |
| Case2: si-BroadcastStatus=broadcastingOndemandinconnected=support | / | / | Send *DedicatedSIBRequest* message |
| Case3: si-BroadcastStatus=notbroadcastingOndemandinconnected=support | Msg1/Msg3 based SI request | Send *DedicatedSIBRequest* message | Send *DedicatedSIBRequest* message |
| Case4:si-BroadcastStatus=notbroadcastingOndemandinconnected=notsupport | Msg1/Msg3 based SI request | / | / |

In addition, configuring case 4 (i.e. *si-BroadcastStatus=notbroadcasting**Ondemandinconnected=notsupport*) does not mean NW must perform unsolicited delivery of the required SIB to the UE in dedicated manner. For example, we can have such setting for cell reselection related SIBs and only UE in inactive/idle need such SIBs and can send Msg1/Msg3 based SI request, which is also one possible way to prohibit UE in connected from sending *DedicatedSIBRequest* for such SIBs.Although we agree that UE in connected will not request the cell reselection related SIBs, we still do not know whether we will have SIBs with similar requirements from other Rel-16 WIs or in future release. Having such an indication offers more flexibility and is more future-proof. |
| CATT | Option 1 or Option 3 | We think it can re-use *si-broadcaststatus* bit to represent whether the network supports this feature or not. If Broadcast bit indicates ‘notbroadcasting’, it means the network shall support this feature, so that the connected UE can request the SIBs by on-demand. Otherwise, the connected UE can’t work due to no receiving SIBs.For option3, we think it’s another issue which is to address whether R16 connected UE can request the R15 SIB to a R15 gNB. Unless SIB9 can be requested on-demand, there will be no such issue for R15 gNB. |
| OPPO | Option 1 | Agree with Futurewei. |
| Lenovo | Option 2 | It is our understanding that any new feature introduced from Rel-16 and later is optional for the network. |
| Huawei | NothingIf not , Option2 | First, we think this indication may not be necessary. Note that this UE is in RRC-CONNECTED where the network has already provided RRC configuration to the UE. If the UE is configured as IIoT UE, the network should guarantee that the UE has all the proper configurations for normal functioning and provide the SI request service to the UE if necessary. The legacy *broadcastStatus* is per SI message. If we want to reuse it for the indication of whether R16SI request is suppoeted, the SI message cannot be a mixture of R15 SIBs and R16 SIBs. But that is not sure yet since SIB9 can possibly be requested according to the proposals from some company. In addition, if this can be done that per SI message indication can indicate the gNB capability of SI request, we don’t think the solution is quite clean enough. If the bit is used for supported/notSupported, does it means that the network cannot indicate if the SI message is broadcast/notBroadcast? But anyway, if we use this bit, the bits for all the SI messages containing R16 SIBs all need to be set to the same value, the solution does not look clean.  |
| Apple | Option 2 | Since we assume all R16 features can be optional to UE and NW, it would be better for NW to have an explicit indication on enabling “on demand SI request for connected UE”. By the way, this is already captured in the running CR. |
| QCOM | Option-2 | For different infra choice in supporting this feature or not |

**Rapporteur input**: Regarding Q2, we have the following distribution in the replies:

Option 1: 5

Option 2: 7

Option 3: 5

Even if there is a slight preference for having an explicit indication by the NW for enabling this feature, there is still not a clear majority and no consensus on the option to adopt. On top of this, this decision is also linked to the SIB9 discussion within the IIoT WI and, therefore, our suggest would be to wait the outcome of the IioT WI in order to make a decision on this. Therefore, we suggest:

1. Whether an implicit or explicit NW indication is needed for enabling the on-demand SIB in CONNECTED is FFS (i.e., pending IioT WI decision on SIB9).

## Issue 2.3 DL response by the network

In the email discussion [108#61][R16], an issue was discussed about how the UE should handle the DL response sent (or not) by network upon receiving the on-demand request for certain SIB(s). Further, this issue was discussed during the online session on Thursday and no conclusion has been reached regarding this issue:

[R2-2000875](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_109_e%5CDocs%5CR2-2000875.zip) Summary of [108#61][R16] On-demand SI procedure in RRC\_CONNECTED\_summary Ericsson discussion Rel-16 NR\_unlic-Core, 5G\_V2X\_NRSL-Core, NR\_IIOT-Core

DISCUSSION

P5

- ZTE think this shall be left for UE implementation and need no further discussion. CATT agrees.

- MTK think that the network should always respond. Would there be networks that do not have this capability?

- LG think a prohibit timer would be useful. Vivo think this is useful for congestion case. Lenovo think there might be a case.

- Samsung assume that the UE know if the network has this capability, and there is two delivery mechanisms, dedicated and if the UE has common seach space, broadcast delivery is possible, and think this does not need to be specified. Intel agrees. CATT agrees as well. NEC also agrees.

- Apple also think the network shall always reply

- Chair proposes: The UE knows whether the network has capability for this feature (e.g. based on existing indication or FFS new indication), and it is assumed that the network always replies to a UE request. Ericsson think that the network can choose to ignore the UE, e.g. at high load.

- Intel think the network should always reply, and the only abnormal case when network doesn’t reply is if the network loses the message.

- Nokia think we don’t need to standardize much for this.

- Huawei would be ok either way,

- Ericsson strongly think a prohibit timer would be needed. Samsung think we didn’t introduce a prohibit timer in R15.

- Intel wonder what “UE implementation” would mean? The procedure would normally always be successful.

- Apple think that anyway modification period would be a normal condition in the UE.

- Ericsson think there already is a method for the network to reject access in Idle/inactive mode, but not for connected. For V2X there may be cases with very frequent requests.

Some company assumes that, upon the request, the UE expect always a DL reply from the network. This DL may be via broadcast of via dedicated signalling, depending of the network choice (except for the case of a UE with no CSS configured where the DL reply is only via dedicated signalling.

Assuming this, another aspect that is not clear at the moment is what is the UE behaviour if the DL request does not arrive (or anyway arrive with certain delay due to the congestion or bad radio conditions). Here, the options were different, and no common understanding was reached. The different UE behaviours discussed, were:

1. The UE, if not receiving a DL response, it triggers again the on-demand SIB procedure.
2. The UE waits until receiving a DL response

According to this, we would like to check with companies what is their understanding regarding the possible UE behaviours described.

Q3: Do companies agree on the UE behaviour described in Option 1 and Option 2?

|  |  |  |
| --- | --- | --- |
| Company | Yes/No | Comment |
| Samsung |  | In the Web CC there was common understanding that the scenarios such as congestion is abnormal condition. Smart NW implementation will change the status of broadcast bit from notbroadcasting to broadcasting to avoid UE request in such abnormal situations.For another scenario that the UE request is lost due to bad radio conditions in this situation the UE will encounter RLF.In our opinion Q3 is not justified and not a valid question |
| Ericsson | Yes | In our understanding, the scenarios described in Option 1 and Option 2 may happen. We acknowledge that they may be not common in normal network condition, but we should address also the cases on when the network is overloaded, loses the RRC message, or the DL response may come with some delay. |
| Futurewei |  | Connected UE should know the request message has been delivered to network.If the requested SI is not received, UE just can’t use it.The UE doesn’t need to retransmit the request, and the UE doesn’t need to stop everything and “wait for the response” |
| NEC |  | As the baseline, agree with Option 1. The timing of retry would be e.g. after next modification boundary or the 2nd next. This could be up to UE implementation.However, what RAN2 discussed was the corner case where the requested SIB is not deliverered for very long time or even never due to abnormal situation. We do not see need of any additional specification. |
| MediaTek | See comment | We think the network should always reply, even if with an empty reconfiguration. (Note that if we don’t have a network indication in Q2 above, even a network that doesn’t support the feature should be able to send an empty reconfiguration in response to the request message—otherwise we have problems with the UE waiting for a reply that will never come, or re-requesting uselessly.) We agree with the chair’s proposal from the online discussion:

|  |
| --- |
| Chair proposes: The UE knows whether the network has capability for this feature (e.g. based on existing indication or FFS new indication), and it is assumed that the network always replies to a UE request. |

So we think option 2 is valid; the UE should be able to anticipate that there will be a response, and wait for it, without being stuck waiting forever before it can declare that the underlying operation can proceed or fail. Option 1 shouldn’t occur. |
| Nokia |  | This question is vague. It is asking whether the UE can do Option 1 and Option 2, when left to UE implementation, to handle an error scenario resulting from NW congestion or radio link failure. Of course, UE implementation can do anything in this case when the UE behaviour is not standardized. On second thought, from a NW perspective we are now open to protect the NW from flood of UL signalling for the described scenario. |
| LG | Yes | We think this is direcly linked to the following issue – prohibit timer. The question is whether the UE is allowed to trigger re-request without any restrition. Since we do not mandate anything regaring when the network should response for this feature, a prohibit timer, as a minimal mechanism, can control UE’s re-request and enable more straightforward UE implementation. |
| Intel |  | Firstly, UE should know if network supports on-demand in connected mode. Under this assumption:Under normal scenario, network will receive the UE request and act on it. Regarding potential abnormal conditions: The scenario where it is lost over the radio will eventually result in an RLF. If network is congested, network may delay the response but it will still hold and act on the request. There is no benefit in UE repeating the request.In summary, there does not seem to be a no need for UE to repeat the SI request for the same SIB. |
| ZTE |  | Both option 1 and option 2 are possible when left to UE implementation to handle the abnormal case that NW supports on demand SI request in connected but does not providing feedback due to NW congestion or radio link failure. |
| CATT |  | Agree with Samsung. The network can choice dedicated or broadcast mechanism to deliver the SIBs to connected UE, if the cases of congestion or bad radio condition happened. It’s up to the network implementation. Thus, we think no issues for both option 1 and option 2. |
| OPPO |  | We can not see any ecessary to specify anything for it. It can be up to UE implementation. |
| Lenovo |  | Referring to the latest discussion, our understanding of UE behavior is acc. To Option 2  |
| Huawei |  | Leave to UE implementation |
| Apple | Option 1 | Both options are feasible. Our point is NW side should do its best to provide the DL response. And if NW side does not provide it in some corner case (i.e, congested), we would like to leave it to UE implementation on when to trigger it again. |
| QCOM |  | Leave it to UE implementation  |

Now, if Option 1 is true, what it may happen is that multiple UE may keep requesting certain SIBs to the network thus causing even more congestion and overhead on the network side. One possible use case for this situation, is given by platooning use case for V2X, where a group of cars may keep requesting the V2X SIB if this is not delivered in a reasonable time.

If Option 2 is true, the UE may wait for along amount of time for a response that may come with delay (or may never come).

Even if Option 2 may not be an issue, in case of Option 1 a solution is needed to avoid the network to be overflooded with continue on-demand SIB request. Therefore, a prohibit timer (as discussed in the online session) may be a good solution to avoid this.

We note also that, for the on-demand request in IDLE/INACTIVE no prohibit timer has been specified because the network has the possibility to reject the UE request once that this performs random access to acquire the SIB. However, for the on-demand SIB in CONNECTED, the network so far does not have this possibility.

Therefore, we would like to ask companies whether a prohibit timer is needed for the on-demand SIB in CONNECTED.

Q4: Do companies agree to specify a prohibit timer for the on-demand SIB in CONNECTED?

|  |  |  |
| --- | --- | --- |
| Company | Yes/No | Comment |
| Ericsson | Yes | In the on-demand SI for IDLE/INACTIVE, the network has still some form of control in rejecting the request of the UE. In fact, the network can reject the UE request once this perform the RRC setup/resume for acquiring the requested SIB.In case of on-demand SIB for CONNECTED, the network cannot control the requests made by the UE and it totally exposed to possible overloading or overflooding caused by continue on-demand requests made by the UE.For this reason, a prohibit timer may help preventing these phenomena. On top of this, for all the procedure triggered autonomously by the UE a prohibit timer is always configured and we prefer to have the same principle also here. |
| Futurewei | No | UE in Connected state should know if the request has been received by gNB, as it is sent by RRC message. |
| NEC | No (unless clearly justified) | we want to clarify the situation more..As discussed, Idle/Inactive on-demand SI request via preamble can be rejected if the overload happen (agree). However, it can be also done via Msg3, where such rejection cannot be expected. This is same or similar as on-demand SI in Connected but still no prohibit timer. For overload case, the network can have a choice to not send UL grant or even not allocated dedicated SR resource. The UE may try RACH for SR, the network can configure e.g. back-off time. if the overload is really the issue, the network can handle somehow. if this is not sufficient (and thus prohibit timer is justified), we can agree to support the timer. So far, seems not. |
| MediaTek | No | As noted above, we don’t see a good reason for the network not to respond, so we don’t see a need for a prohibit timer. Assuming the network always responds with something, the UE has no reason to re-request—a network that declined to deliver the SIB is not going to change its mind if the request is repeated.Even if the network is allowed to silently ignore the request, we don’t see a benefit for the UE to retransmit the request when this happens. The signalling is all RLC AM, so the UE knows its request was received and that the response would be delivered if there is one. In this case the UE would need a supervisory timer to determine when to give up, which could be specified (e.g. tied to the modification period) or left to UE implementation, but at expiry of this timer, the rational behaviour would be to treat it as an acquisition failure, not to repeat the request. |
| Nokia | Yes | We are open to protecting the NW from flood of UL signalling and prohibit timer mechanism is already well known for other use cases and scenarios and could be applied for OSI in connected feature also. |
| LG | YEs | The question is whether the UE is allowed to trigger re-request without any restrition. Since we do not mandate anything regaring when the network should response for this feature, a prohibit timer, as a minimal mechanism, can control UE’s re-request and enable more straightforward UE implementation. |
| Intel  | Depends on Q3 | If the UE is not allowed to repeat the request as indicated in Q3, there is no need for prohibit timer.If RAN2 decides UE is allowed to repeat the SIB request, then Intel supports use of prohibit timer. |
| ZTE | No | No prohibit timer has been specified for Msg3 based SI request from UE in idle and inactive, we do not see specific need to have one for the on demand SI request for UE in connected. |
| CATT | No | As comments in Q3, we don’t think the prohibit timer is necessary. |
| OPPO | No | Agree with MediaTek. |
| Lenovo | Yes | Prohibit timer is a beneficial mechanism for the NW to control the UL requests. |
| Huawei | No |  |
| Apple | No | It’s not necessary to introduce a prohibit timer. We think that anyway SI modification period would be a normal condition in the UE to trigger the request again. |
| QCOM | No | Since neither option-1 (or 2) are needed, we don’t see the reason for the prohibit timer |

**Rapporteur input**: According to the replies in Q3 and Q4, there is no common understanding on whether a prohibit timer is needed to not allow the UE to keep requesting the SIB if this is not received (or delayed) due to network congestion. However, a possible way forward that we feel to suggest it to have some basic agreement where we clarify that, in case the requested SIB is not received (or received with delay), the UE does not trigger the on-demand SIB request again, but it treat this as a delivery failure. This would protect the NW to be overflood with UE requests and, at the same time, no prohibit timer is needed to be specified. Therefore, out suggestion is:

1. If the requested SIB is not received (or received with delay) the UE does not trigger again the on-demand SIB request.

## Issue 2.6 Triggering of the on-demand SIB procedure while in CONNECTED

A good number of companies addressed the issue on when to trigger the on-demand SIB procedure for CONNECTED. In particular, the following proposals have been made regarding this issue:

* Specify following additional conditions for triggering SI request:[1] (Samsung)
	+ If common search space is configured in the active BWP and if required SIB is supported in cell (i.e. required SIB is mapped to a SI message as per si-SchedulingInfo) and for the SI message mapped to required SIB, si-BroadcastStatus is set to notBroadcasting in stored SIB 1 acquired in current modification period: UE initiate transmission of the DedicatedSIBRequest message
	+ If common search space is not configured in the active BWP and if required SIB is supported in cell (i.e. required SIB is mapped to a SI message as per si-SchedulingInfo) in stored SIB 1, UE initiate transmission of the DedicatedSIBRequest message
* For SIBs with value tag in SIB1, UE can make an on-demand request for the SIB upon detecting a change in SIB based on the value tag in SIB1 and the UE feature requirement.[2] (Intel)
* Add a UE requirement in RRC to acquire the other SIBs based on UE internal requirement. [2] (Intel)
* No need to introduce separate trigger condition of RRC Connected UE to request on demand SI.[4] (Apple)
* The UE may trigger the on-demand SIB procedure while in RRC\_CONNECTED, but only upon the reception of SIB1. Otherwise the UE shall not trigger the on-demand SIB procedure. [6] (Ericsson)
* To confirm that UE in RRC\_CONNECTED is required to check SIB1 before requesting some SIBs. [9] (LG)

According to the proposals made by the company, it is possible to substantially divide them in two main options:

1. If the UE does not have a valid stored version of that SIB, the UE triggers the on-demand SIB request only after checking if the required SIBs are mapped to a SI message as per *si-SchedulingInfo* in SIB1. If a CSS is configured in a active BWP the on-demand request is triggered only for those SIBs with a *si-BroadcastStatus* is set to *notBroadcasting* (Samsung, Ericsson)
2. The UE triggers the on-demand SIB request based on UE requirements (Intel)
3. No other triggers are needed for on-demand SIB in CONNECTED. (Apple, LG, Ericsson)

Looking at the possible options, we believe that Option 1 is somehow need in case the UE has not store a valid version of a SIB and needs to acquire a new one. Nevertheless, we think that basic principle that is reflected in Option 3 should be also clarified because not crystal clear in the current specification. In fact, the UE should trigger the on-demand SIB request only after checking if the required SIBs are mapped to a SI message as per *si-SchedulingInfo* in SIB1. If a CSS is configured in an active BWP, the on-demand request is triggered only for those SIBs with a *si-BroadcastStatus* is set to *notBroadcasting*. Otherwise, if no CSS is configured for an active BWP, then the on-demand request is done regardless of the *si-BroadcastStatus* since the UE cannot check the broadcast channel. Therefore, our suggestion is to have the following:

Proposal 2 The UE should trigger the on-demand SIB request only after checking if the required SIBs are mapped to a SI message as per *si-SchedulingInfo* in SIB1.

* 1. If a CSS is configured in an active BWP, the on-demand request is triggered only for those SIBs with a *si-BroadcastStatus* is set to *notBroadcasting*.
	2. if no CSS is configured for an active BWP, then the on-demand request is done regardless of the *si-BroadcastStatus* since the UE cannot check the broadcast channel.

Proposal 3 If the UE does not have a valid stored version of a SIB, the same principles described in P2 are applied.

Therefore, we would like to ask companies whether they agree with the two proposals formulated above.

Q5: Do companies agree with Proposal 2?

|  |  |  |
| --- | --- | --- |
| Company | Yes/No | Comment |
| Samsung | Yes | We agree with the rapporteur summary. Therefore, we support P2 |
| Ericsson | Yes | This is currently supported in the running CR |
| Futurewei | Yes |  |
| NEC | Yes |  |
| MediaTek | Yes | The rapporteur summary above seems correct. |
| Nokia | Yes | I thought a) under Proposal 2 is already the way it is specified for on-demand SI in general. May be the proposal 2 texts should make it very clear that these are for OSI in connected case. |
| LG | Yes | Support P2 (we think that these were already agreed long before and we are only having some more clarification?) |
| Intel | Mostly | We agree with the general principle. We would like to make a couple of additonal aspects:1. 1) UE will request it only if it requires the SIB for the feature - not necessarily for all SIB. That is, for example, UE will trigger on demand positioning SIB only if it requires it.

2) Even for no CSS case, UE will be provided with SIB1 over dedicated signalling and UE can check *si-BroadcastStatus.* The SIBs will not be broadcast of course – so the end result is the same as in the proposal. |
| ZTE | Yes |  |
| CATT | Yes | Share the same view as rapporteur. |
| OPPO | Yes  |  |
| Lenovo | Yes |  |
| Huawei | Yes |  |
| Apple | Yes |  |
| QCOM | Yes | Same logic but adjusted (to be more practical):*- if si-BroadcastStatus* is set to *notBroadcasting 🡪 UE triggers the on-demand SIB request regardless if CSS is configured or not**- else if SI are broadcased, if CSS is not configured 🡪 UE triggeres the on-demand SIB request.* |

Q6: Do companies agree with Proposal 3?

|  |  |  |
| --- | --- | --- |
| Company | Yes/No | Comment |
| Samsung | Yes | We agree with the rapporteur summary. Therefore, we support P3 |
| Ericsson | Maybe | According to 5.2.2.4.2 the UE in RRC\_CONNECTED with T311 not running is not triggering the on-demand SI when it has not stored a valid version of a SIB. Therefore, we are not sure whether we should allow a different behaviour from what has been done in Rel-15. |
| Futurewei | Yes but | The triggering conditions describes in P2 are required before a UE performs on-demand request of a SIB. But a UE doesn’t have to trigger on-demand request of an SIB, if it doesn’t have use of it. In other words, what described in P2 are necessary conditions, not sufficient conditions. |
| NEC | Maybe | but not sure whether any further specification impact is expected? |
| MediaTek | Yes | We actually thought this was assumed in P2. Surely if the UE does have a valid stored version of the SIB, it will use the stored version rather than requesting it again, and P2 will not apply to this case. Do we miss something?We also agree with Futurewei’s comment; the UE is not required to maintain an up-to-date version of every SIB (the requirements depend on the involved feature). |
| Nokia | Maybe | The scope keeps on increasing for this OSI in connected enhancement which started without a proper WID and encompassing multiple other WIDs. I think we should stop at some point if we want to finish Rel-16 |
| LG | Yes | Any specification impact, on top of P2? |
| Intel | Mostly | Agree in principle. One additonal aspects to consider:As pointed out above, UE will request a SIB when and only if it requires the SIB for the feature. For example, UE will trigger on demand positioning SIB only if UE requires the positining SIB . Additonally, UE cannot detect if it has a valid SIB based on SIB1 for positioning SIB.In summary, UE requests is based on feature requirement. |
| ZTE | Yes |  |
| CATT | Yes, with comments | If the UE does not have a valid stored version of a SIB and the UE want to use this SIB, then UE can follow the proposal 2 to trigger the request. |
| OPPO | Yes  |  |
| Lenovo | Yes |  |
| Huawei | Yes |  |
| Apple | In general Yes | This seems straightforward but we also would like tot see how it is captured into the running CR.  |
| QCOM | yes |  |

**Rapporteur input**: According to the replies collected in Q5 and Q6, it seems that there is consensus to agree on the principle that the UE should trigger the on-demand SIB request only after checking if the required SIBs are mapped to a SI message as per *si-SchedulingInfo* in SIB1. Further, if a CSS is configured in an active BWP, the on-demand request is triggered only for those SIBs with a *si-BroadcastStatus* is set to *notBroadcasting*. Otherwise, if no CSS is configured for an active BWP, then the on-demand request is done regardless of the *si-BroadcastStatus* since the UE cannot check the broadcast channel. Same principle are also valid for the case where the UE does not have a valid stored version of a SIB. Therefore, we suggest:

1. The UE should trigger the on-demand SIB request only after checking if the required SIBs are mapped to a SI message as per si-SchedulingInfo in SIB1.
	1. If a CSS is configured in an active BWP, the on-demand request is triggered only for those SIBs with a si-BroadcastStatus is set to notBroadcasting.
	2. if no CSS is configured for an active BWP, then the on-demand request is done regardless of the si-BroadcastStatus since the UE cannot check the broadcast channel.
2. If the UE does not have a valid stored version of a SIB, the same principles described in P5 are applied.

## Issue 2.7 On-demand SIB request upon reconfiguration with sync (handover)

Two contributions from Samsung and LG had made proposal regarding the handling of the on-demand SIB request during reconfiguration with sync (handover). The following is proposed:

* Upon receiving RRC reconfiguration message which includes reconfigurationWithSync in spCellConfig of an MCG and dedicatedSIB1-Delivery, SI request is initiated when MAC of MCG completes the random access procedure towards the target SpCell.[1] (Samsung)
* DedicatedSIBRequest-r16 is not included in the HandoverPreparationInformation. [9] (LG)

Samsung and LG tackle two different issue related to reconfiguration with sync. Samsung targets the case on when the *dedicatedSIB1-Delivery* is included in *RRCReconfiguration* together with the *reconfigurationWithSync*. Our option would be that this issue could be easily solved by network implementation without requiring to specify any network behaviour. In fact, the network can avoid sending *dedicatedSIB1-Delivery* together with *reconfigurationWithSync*. Nevertheless, we acknowledge that what proposed by Samsung can be also a possible solution. Therefore, we suggest to discuss these two options:

Proposal 4 RAN2 to discuss how to handle the case where *dedicatedSIB1-Delivery* is included in *RRCReconfiguration* together with the *reconfigurationWithSync*.

* 1. Leave it to network implementation (e.g., *dedicatedSIB1-Delivery* not sent together with *reconfigurationWithSync*.)
	2. The on-demand SIB request is initiated by the UE only after successful completion of random access toward the target SpCell.

Q7: Which of the two Options should be pursued for the issue described in Proposal 4?

|  |  |  |
| --- | --- | --- |
| Company | Option | Comment |
| Samsung | Option2 | option1 breaks Rel15 behaviour. There is no need to impose unnecessary NW implementation |
| Ericsson | Option 1 | Our understanding is that this can be handled by network implementation without further standardization effort. However, if majority of companies prefer to go for Option 2, we are also ok with it. |
| Futurewei | Option 2, but | On-demand request is triggered only when UE needs the SIB. In other words, the on-demand SIB request in Connected mode can be separate from HO procedure. |
| NEC | Option 2 |  |
| MediaTek | Option 2 | This seems like the natural extension of Rel-15 behaviour; the UE is in connected mode with the target cell after it completes the random access, and it can then initiate connected-mode procedures such as the SIB request. |
| Nokia | Option 2 | Since there exists the option for NW to include dedicatedSIB1-Delivery in RRCReconfiguration with the reconfigurationWithSync, Option 2 seem to be a reasonable behaviour to clarify. |
| LG | Option2 | Sufficieint to follow legacy principle |
| Intel | ? | Isn’t *dedicatedSIB1-Delivery* a Rel-15 discussion? We don’t fully understand option 2 in relation to *dedicatedSIB1-Delivery.*It is up to network implementation whether to include target SIB1 in HO command or immediately after the HO.UE requests other SIBs if it has not received it after HO based on an implementation specific timer. |
| ZTE | ? | It is up to network implementation whether to include target SIB in HO command or immediately after the HO. If UE has not received the required SIB during HO, it can request it after HO in implementation. |
| OPPO | Option 2 |  |
| CATT | Option 2 | We think the case is valid and need to be address. Thus we share the same view as Samsung. |
| Lenovo | Option 2 |  |
| Huawei | Option2 |  |
| Apple | Option 2 | If NW do put dedicatedSIB1-Delivery together with reconfigurationWithSync (Option 1 is not guaranteed), Option 2 can solve the issue for good. |
| QCOM |  | We don’t see the relationship between the Option2 with the imposed question. In addition, option-1 and 2 are not exclusive, in other words, both can co-exist.We prefer that the network sends dedicatedSIB1 with the recofigWithSync, to address the question itself. |

**Rapporteur input**: Regarding Q7, majority of the companies think that upon receiving RRC reconfiguration message which includes *reconfigurationWithSync* in *spCellConfig* of an MCG and *dedicatedSIB1-Delivery*, SI request is initiated when MAC of MCG completes the random access procedure towards the target SpCell. Our understanding of this proposal is that we are not mandating the network to act differently with respect to what is specified in Rel-15. According to this, our suggestion is to capture a RAN2 understanding without having any impact on the specification. Since the is up to network implementation whether to include target SIB1 in HO command or immediately after the HO, the UE should follow what the network decide.

1. RAN2 to confirm that upon receiving RRC reconfiguration message which includes reconfigurationWithSync in spCellConfig of an MCG and dedicatedSIB1-Delivery, SI request is initiated when MAC of MCG completes the random access procedure towards the target SpCell. This does not imply any specification effort.

The proposal from LG, instead, address the issue on whether the to enable a target node to know which SIBs the UE has requested in a source node and hence to provide the same/requested SIBs to the UE by the target node immediately after mobility. In our opinion, the benefits of having of having that information within *HandoverPreparationInformation* is limited and maybe the benefits are not very clear. Therefore, our proposal is to not pursue such optimization given the limited time we have to finish Rel-16.

Proposal 5 *DedicatedSIBRequest-r16* is not included in the *HandoverPreparationInformation*.

Q8: Do companies agree with Proposal 5?

|  |  |  |
| --- | --- | --- |
| Company | Yes/No | Comment |
| Ericsson | Yes |  |
| Futurewei | No strong view | If DedicatedSIBRequest-r16 is included in the HandoverPreparationInformation, couldn’t the target cell include the requested SIB already in HO command? |
| NEC | No strong view | this may be useful at the target |
| MediaTek | Yes | We also think this would be a bit of an optimisation. |
| LG | Yes |  |
| ZTE | Yes |  |
| CATT | Yes | This is an optimization issue. We prefer to keep the procedure simple in this release. |
| OPPO | Yes  |  |
| Lenovo | Yes |  |
| Huawei | Yes |  |
| Apple | No strong view |  |
| QCOM | No strong view |  |

**Rapporteur input**: Regarding Q8, there is a majority view to not include the *DedicatedSIBRequest-r16* in the *HandoverPreparationInformation*. Therefore, our suggestion is:

1. *DedicatedSIBRequest-r16* is not included in the *HandoverPreparationInformation*.

## Issue 2.8 Other unclassified issues

According to papers submitted in the on-demand SIB for CONNECTED agenda item, the following remaining proposals are formulated:

* The *DedicatedSIBRequest* message should be sent after AS security activation.[5] (ZTE)
* The UE indicates a preference of dedicated signalling transmission for the request SIB in the SI request message.[7] (Huawei)
* To support partial delivery of the requested SIB(s) by dedicated signalling, RAN2 is asked to consider the option to send the SI scheduling information of the broadcast SIB(s) using *dedicatedSIB1-Delivery* in the *RRCReconfiguration* message even if the UE has an active BWP with CSS configured.[8] (Lenovo)
* UE is allowed to re-request the same SIB only after a fixed duration since UE has requested but not received the SIB. [9] (LG)

For the first issue raised by ZTE, where is proposed that the *DedicatedSIBRequest* should be sent only after AS security action, we still find hard to understand what the benefits about this are. Usually, SIBs do not need security (i.e., as also stated in Annex B.1 of 38.331). Therefore, we believe that this new message should follow the same principle of e.g., normal RRC messages sent via SRB1. We suggest, then, to not pursue proposal from ZTE.

Regarding the issue raised by Huawei, on whether the UE should be allowed to indicate a preference on how the SIBs should be delivered by the network, this topic was already discussed. The general understanding was that is up to the network to decide how the on-demand requested SIBs should be delivered. However, we agree that no clear agreement has been taken on this and therefore, our proposal is to ask RAN2 to confirm this understanding.

Proposal 6 RAN2 to confirm that It is up to the network to decide how the requested SIBs on-demand should be delivered (i.e., via broadcast or via dedicated RRC signalling).

Q9: Do companies agree with Proposal 6?

|  |  |  |
| --- | --- | --- |
| Company | Option | Comment |
| Samsung |  | In general agree with P6 if CSS is configured. For the case if CSS is not configured then dedicated signalling is the only option. |
| Ericsson | Yes | We already agreed on this principle (i.e., at least when CSS is configured). |
| Futurewei | Yes |  |
| NEC | Yes |  |
| MediaTek | Yes | Agree with Samsung. This is a network implementation choice, but if the network chooses to deliver the on-demand SIBs via broadcast, it still needs to send them to UEs that need them but do not have a CSS configured. |
| Nokia | Yes |  |
| LG | Yes |  |
| Intel | Yes |  |
| ZTE | Yes |  |
| CATT | Yes | It’s the common understanding for the case when CSS is configured. If CSS is not configured, the network only can deliver the SIBs via dedicated RRC signalling. |
| OPPO | Yes  |  |
| Lenovo | Yes |  |
| Huawei | Yes |  |
| Apple | Yes |  |
| QCOM | Yes but | Our concern if CSS is not configured for the UE (reason for triggering the on-demad in the first place), broadcasting the SIBs won’t be helpful … dedicated SIBs is expected from network |

**Rapporteur input**: Regarding Q9, there is common understanding that It is up to the network to decide how the requested SIBs on-demand should be delivered (i.e., via broadcast or via dedicated RRC signalling). Therefore, we suggest:

1. RAN2 to confirm that It is up to the network to decide how the requested SIBs on-demand should be delivered when the UE is configured with a CSS in an active BWP (i.e., via broadcast or via dedicated RRC signalling).

Regarding the issue raised by Lenovo, our understanding is that the proposal made is not strictly related to on-demand SIBs feature, but it will be going to affect the SIB procedure in general. For this reason, we believe that this is not the right place where this proposal should be made and our suggest is to not pursue it.

Regarding the final issue raised by LG, our understanding is that this topic will be discussed in the email discussion [108#61][R16]. Our suggestion is, therefore, to not have any proposal here and to discuss it during the email discussion.

# 3 Conclusion

According to the contributions submitted regarding this topic, the following proposals are made:

Proposal 1 The UE shall not request on-demand the SIB specified in the DCCA WI for early measurements.

Proposal 2 Whether an implicit or explicit NW indication is needed for enabling the on-demand SIB in CONNECTED is FFS (i.e., pending IIoT WI decision on SIB9).

Proposal 3 If the requested SIB is not received (or received with delay) the UE does not trigger again the on-demand SIB request.

Proposal 4 The UE should trigger the on-demand SIB request only after checking if the required SIBs are mapped to a SI message as per si-SchedulingInfo in SIB1.

* 1. If a CSS is configured in an active BWP, the on-demand request is triggered only for those SIBs with a si-BroadcastStatus is set to notBroadcasting.
	2. if no CSS is configured for an active BWP, then the on-demand request is done regardless of the si-BroadcastStatus since the UE cannot check the broadcast channel.

Proposal 5 If the UE does not have a valid stored version of a SIB, the same principles described in P5 are applied.

Proposal 6 RAN2 to confirm that upon receiving RRC reconfiguration message which includes reconfigurationWithSync in spCellConfig of an MCG and dedicatedSIB1-Delivery, SI request is initiated when MAC of MCG completes the random access procedure towards the target SpCell. This does not imply any specification effort.

Proposal 7 *DedicatedSIBRequest-r16* is not included in the *HandoverPreparationInformation*.

Proposal 8 RAN2 to confirm that It is up to the network to decide how the requested SIBs on-demand should be delivered when the UE is configured with a CSS in an active BWP (i.e., via broadcast or via dedicated RRC signalling).

# 4 References

1. [R2-2000228](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_109_e/Docs//R2-2000228.zip), Remaining Issues of On Demand SI Procedure in RRC Connected, Samsung Electronics Co., Ltd, RAN2#109-e, Electronic Meeting, February 2020

1. [R2-2000478](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_109_e/Docs//R2-2000478.zip), Remaining open issues on on-demand request in Connected mode, Intel, RAN2#109-e, Electronic Meeting, February 2020

1. [R2-2000500](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_109_e/Docs//R2-2000500.zip), On-demand SI support for EN-DC SCG, vivo, RAN2#109-e, Electronic Meeting, February 2020

1. [R2-2000607](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_109_e/Docs//R2-2000607.zip), Discussion on open issues in On Demand SI, Apple, RAN2#109-e, Electronic Meeting, February 2020

1. [R2-2000667](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_109_e/Docs//R2-2000667.zip), Remaining issues on on-demand SI in connected, ZTE Corporation, Sanechips, RAN2#109-e, Electronic Meeting, February 2020

1. [R2-2000878](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_109_e/Docs//R2-2000878.zip), Open issues list for on-demand SIB, Ericsson, RAN2#109-e, Electronic Meeting, February 2020

1. [R2-2000972](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_109_e/Docs//R2-2000972.zip), Discussion on SI request enhancement for Connected UEs, Huawei, HiSilicon, RAN2#109-e, Electronic Meeting, February 2020

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1. [R2-2001522](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_109_e/Docs//R2-2001522.zip), Resolving open issues for on-demand SI, LG Electronics France, RAN2#109-e, Electronic Meeting, February 2020