3GPP TSG-RAN WG2 #112 electronic R2-20xxxxx

Electronic Meeting, Nov 2-13, 2020

Agenda Item: 5.4.3

Source: ZTE, Sanechips

Title: Summary of offline [AT112-e][012][NR15] UE caps II (ZTE)

Document for: Discussion, Decision

# 1 Introduction

This contribution summarizes the following discussion:

* [AT112-e][012][NR15] UE caps II (ZTE)

Treat R2-2008710, R2-2009238, R2-2009239, R2-2009162, R2-2009163, R2-2009516, R2-2009517, R2-2010537, R2-2010536, R2-2010541, R2-2010540, R2-2009944

Intended outcome: Intermediate: Determine agreeable parts. Final: For agreeable parts, agreed CRs.

Deadline: Intermediate deadline(s) by Rapporteur, Final: Discussion stop at Wed Nov 11, 1200 UTC

**Contact from companies**

|  |  |
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# Discussion

## 2.1 Part 1: Intended to determine agreeable parts

Part 1 discussion is focusing on reaching conclusion whether the proposals/CRs can be agreed in principle, and Part 2 discussion would then focus on detailed changes for those agreeable contributions.

### 2.1.1 Clarify UE capability in case of cross-carrier operation

[R2-2008710](file:///D:/Documents/3GPP/tsg_ran/WG2/TSGR2_112-e/Docs/R2-2008710.zip) LS on Interpretation of UE Features in Case of Cross-Carrier Operation (R1-2007334; contact: ZTE) RAN1 LS in Rel-15 NR\_newRAT-Core To:RAN2

[R2-2009238](file:///D:/Documents/3GPP/tsg_ran/WG2/TSGR2_112-e/Docs/R2-2009238.zip) CR to clarify UE capability in case of cross-carrier operation ZTE Corporation, Sanechips, Ericsson CR Rel-15 38.306 15.11.0 0418 - F NR\_newRAT-Core

[R2-2009239](file:///D:/Documents/3GPP/tsg_ran/WG2/TSGR2_112-e/Docs/R2-2009239.zip) CR to clarify UE capability in case of cross-carrier operation ZTE Corporation, Sanechips, Ericsson CR Rel-16 38.306 16.2.0 0419 - A NR\_newRAT-Core

**Q1 Do companies agree with the CRs above?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Agree?**  **(Yes or No)** | **Comments** |
| Ericsson (Lian) | Yes (Proponent) |  |
| Qualcomm Incorporated | Yes, but | We agree to the intention of the CRs.  The category “Per serving cell” does not seem to be scalable for future extension, because in the future there can be UE capabilities which should be indicated for the serving cell triggering the command.  It can be something like, “Triggered serving cell”. |
| Intel | Yes | We are fine with adding a new Annex for this. The future proofing from Qualcomm is also good in our view. |
| Huawei, HiSilicon | Yes but | Agree with the intention, but prefer to add the clarification in the field description using the similar wording in RAN1 LS, e.g. The UE provides the capability for the band of the scheduled/triggered/indicated cell and the band of the scheduling/triggering/indicating cell. Using “Per serving cell”, “Associated serving cells” is a bit difficult to understand and additional definition is needed. |
| Nokia | Yes | Agree with the intention of the CRs. |
| OPPO | Agree with the intention but with wording suggestion | We suggest the rewording as follows:    For per-serving-cell, the term “for a serving cell” is not accurate since the feature relates to two cells, the scheduling one and the scheduled one; And we are also fine to rename it as suggested by QC above.  For associated-serving-cell, the term “all associated serving cells” are not accurate, i.e., only the band for the scheduled cell and the band for the scheduling cell matter. |
| Apple | Yes |  |
| CATT | Yes, but | We’d better follow the wording in R1 LS, to be crystal clear. |
| MediaTek | Yes, but | Similar as Huawei, prefer to have this in field description |
| LG | Yes | Fine to generate a new Annex section as proposed. We also share the view with other companies that the term “associated cell” is not crystal clear and better to be reworded. |

### 2.1.2 Correction to BWP capability descriptions

[R2-2009162](file:///D:/Documents/3GPP/tsg_ran/WG2/TSGR2_112-e/Docs/R2-2009162.zip) Correction to BWP capability descriptions Nokia, Nokia Shanghai Bell CR Rel-15 38.306 15.11.0 0416 - F NR\_newRAT-Core

[R2-2009163](file:///D:/Documents/3GPP/tsg_ran/WG2/TSGR2_112-e/Docs/R2-2009163.zip) Correction to BWP capability descriptions Nokia, Nokia Shanghai Bell CR Rel-16 38.306 16.2.0 0417 - A NR\_newRAT-Core

**Q2 Do companies agree with the CRs above?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Agree?**  **(Yes or No)** | **Comments** |
| Ericsson (Lian) | Yes | On the change to clarify the relation between *bwp-DiffNumerology* and *bwp-SameNumerology*, wouldn’t it be simpler to say that a UE reporting *bwp-DiffNumerology* shall also report *bwp-SameNumerology*? |
| Qualcomm Incorporated | No | We do not agree to the first change. bwp-DiffNumerology should not include the UE capability for the same numerology.  The rest can be release-16 correction only. |
| Intel | Yes | For the change in *bwp-DiffNumerology*, we also prefer to include a pre-requisite like ‘UE indicating support of this feature shall also indicate support of *bwp-SameNumerology*’. If this is not possible to be done in Rel-15 because of functional NBC, could check whether this can be done from Rel-16? |
| Huawei, HiSilicon | No | The first correction changes the interpretation of *bwp-DiffNumerology*. Not sure if there is the relationship that UE supporting *bwp-DiffNumerology* always supports *bwp-SameNumerology*. If so, prefer to use the wording suggested by Ericsson and Intel. |
| Nokia | Yes | Proponent |
| OPPO | No | Same view as Qualcomm. |
| Apple | Yes | We also prefer to have a pre-requisite as proposed by Intel. |
| CATT | No | We feel nothing is broken without these changes. |
| MediaTek | Partial | For the first change, We prefer not to change meaning of the capabilities.  For the second change (remove type A/B), it looks correct to us. |
| LG | Only the second change | We should not change the meaning of the existing capability bit.  If proper, we are fine to introduce conditional support of *bwp-SameNumerology, conditioned on bwp-DiffNumerology.* |

### 2.1.3 Correction of the description of ue-SpecificUL-DL-Assignment

[R2-2009516](file:///D:/Documents/3GPP/tsg_ran/WG2/TSGR2_112-e/Docs/R2-2009516.zip) Correction of the description of ue-SpecificUL-DL-Assignment Apple CR Rel-15 38.306 15.11.0 0430 - F NR\_newRAT-Core

[R2-2009517](file:///D:/Documents/3GPP/tsg_ran/WG2/TSGR2_112-e/Docs/R2-2009517.zip) Correction of the description of ue-SpecificUL-DL-Assignment Apple CR Rel-16 38.306 16.2.0 0431 - A NR\_newRAT-Core

**Q3 Do companies agree with the CRs above?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Agree?**  **(Yes or No)** | **Comments** |
| Ericsson (Lian) |  | This seems more editorial change, so it could be merged. But we would be fine with the intention, maybe we could avoid referring to this parameter at all and have something as:  “…and associated higher layer configured parameter ~~TDD-UL-DL-ConfigDedicated~~ as specified in TS 38.213 [11]”. |
| Qualcomm Incorporated | Yes, but | We think clarification in release-16 is sufficient. |
| Intel | Yes, but | It would be good to clarify from Rel-15 but merge with other Rel-15 CR |
| Huawei, HiSilicon | Yes, but | Agree above that it is an editorial change and could be merged. |
| Nokia | Yes | Looks okay but merging with rapporteur CRs. |
| OPPO | Yes |  |
| Apple | Yes (proponent) |  |
| CATT | Yes |  |
| MediaTek | Yes, but | Rename of the reference IE is OK, but could be in Rapporteur’s CR. We think the correction could be started from Rel-15. |
| LG | Yes, but | Can be merged into rapporteur CRs |

### 2.1.4 Correction to the use of simultaneous CSI-RS resources

[R2-2010537](file:///D:/Documents/3GPP/tsg_ran/WG2/TSGR2_112-e/Docs/R2-2010537.zip) Correction to the use of simultaneous CSI-RS resources Ericsson CR Rel-15 38.306 15.11.0 0455 - F NR\_newRAT-Core

[R2-2010536](file:///D:/Documents/3GPP/tsg_ran/WG2/TSGR2_112-e/Docs/R2-2010536.zip) Correction to the use of simultaneous CSI-RS resources Ericsson CR Rel-16 38.306 16.2.0 0454 - A NR\_newRAT-Core

**Q4 Do companies agree with the CRs above?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Agree?**  **(Yes or No)** | **Comments** |
| Ericsson (Lian) | Yes (Proponent) |  |
| Qualcomm Incorporated | Yes |  |
| Intel | Yes |  |
| Huawei, HiSilicon | Yes | Agree with the intention. Not sure if it is clear enough as the whole sentence is removed. How about the following? No strong view.  …This parameter limits the total number of active NZP-CSI-RS resources across all CCs, and across MCG and SCG in case of NR-DC (irrespective of the associated codebook type)…  …This parameter limits the total number of ports across all active NZP-CSI-RS resources across all CCs, and across MCG and SCG in case of NR-DC (irrespective of the associated codebook type)… |
| Nokia | No | There was a long discussion on this one and our understanding from that discussion is that from the UE point of view it is important to have UE capabilities for both “configured” and “active/simultaneous” resources.  By removing the sentence below, does it mean the network can configure more resources but these are then limited by the previous sentence? Unfortunately, looks to us like a NBC.  We are not ready to accept this for the moment for agreement.  ***csi-RS-IM-ReceptionForFeedbackPerBandComb***  Indicates support of CSI-RS and CSI-IM reception for CSI feedback. This capability signalling comprises the following parameters:  - *maxNumberSimultaneousNZP-CSI-RS-ActBWP-AllCC* indicates the maximum number of simultaneous CSI-RS resources (irrespective of the associated codebook type) in active BWPs across all CCs, and across MCG and SCG in case of NR-DC. The network applies this limit in addition to the limits signalled in *MIMO-ParametersPerBand-> maxNumberSimultaneousNZP-CSI-RS-PerCC* and in *Phy-ParametersFRX-Diff-> maxNumberSimultaneousNZP-CSI-RS-PerCC*;  - *totalNumberPortsSimultaneousNZP-CSI-RS-ActBWP-AllCC* indicates the total number of CSI-RS ports in simultaneous CSI-RS resources (irrespective of the associated codebook type) in active BWPs across all CCs, and across MCG and SCG in case of NR-DC. The network applies this limit in addition to the limits signalled in *MIMO-ParametersPerBand-> totalNumberPortsSimultaneousNZP-CSI-RS-PerCC* and in *Phy-ParametersFRX-Diff-> totalNumberPortsSimultaneousNZP-CSI-RS-PerCC*.  The UE is mandated to report *csi-RS-IM-ReceptionForFeedbackPerBandComb*. |
| OPPO | No | Similar view as Nokia |
| Apple | Yes | In general, we think the change is right and needed.  We suggest some further changes as following:  - *maxNumberSimultaneousNZP-CSI-RS-ActBWP-AllCC* indicates the maximum number of simultaneous active CSI-RS resources (irrespective of the associated codebook type) in active BWPs across all CCs, and across MCG and SCG in case of NR-DC, according to the active CSI-RS definition in Clause 5.2.1.6 in 38.214. The network applies this limit in addition to the limits signalled in *MIMO-ParametersPerBand-> maxNumberSimultaneousNZP-CSI-RS-PerCC* and in *Phy-ParametersFRX-Diff-> maxNumberSimultaneousNZP-CSI-RS-PerCC*;  - *totalNumberPortsSimultaneousNZP-CSI-RS-ActBWP-AllCC* indicates the total number of CSI-RS ports in simultaneous active CSI-RS resources (irrespective of the associated codebook type) in active BWPs across all CCs, and across MCG and SCG in case of NR-DC, according to the active CSI-RS definition in Clause 5.2.1.6 in 38.214. The network applies this limit in addition to the limits signalled in *MIMO-ParametersPerBand-> totalNumberPortsSimultaneousNZP-CSI-RS-PerCC* and in *Phy-ParametersFRX-Diff-> totalNumberPortsSimultaneousNZP-CSI-RS-PerCC*.  ***csi-RS-IM-ReceptionForFeedback***  Indicates support of CSI-RS and CSI-IM reception for CSI feedback. This capability signalling comprises the following parameters:  - *maxConfigNumberNZP-CSI-RS-PerCC* indicates the maximum number of configured NZP-CSI-RS resources per CC;  - *maxConfigNumberPortsAcrossNZP-CSI-RS-PerCC* indicates the maximum number of ports across all configured NZP-CSI-RS resources per CC;  - *maxConfigNumberCSI-IM-PerCC* indicates the maximum number of configured CSI-IM resources per CC;  - *maxNumberSimultaneousNZP-CSI-RS-PerCC* indicates the maximum number of simultaneous active CSI-RS-resources per CC, according to the active CSI-RS definition in Clause 5.2.1.6 in 38.214;  - *totalNumberPortsSimultaneousNZP-CSI-RS-PerCC* indicates the total number of CSI-RS ports in simultaneous active CSI-RS resources per CC, according to the active CSI-RS definition in Clause 5.2.1.6 in 38.214.  The UE is mandated to report csi-RS-IM-ReceptionForFeedback. |
| CATT | yes | We agree with the intention of these CRs. Regarding the wording we are open to check what’s acceptable by majority. |
| LG | No | We think the current text already reflects the intention of RAN1 discussion. |

### 2.1.5 Correction to pdcch-MonitoringSingleOccasion

[R2-2010541](file:///D:/Documents/3GPP/tsg_ran/WG2/TSGR2_112-e/Docs/R2-2010541.zip) Correction to pdcch-MonitoringSingleOccasion Ericsson CR Rel-15 38.306 15.11.0 0459 - F NR\_newRAT-Core

[R2-2010540](file:///D:/Documents/3GPP/tsg_ran/WG2/TSGR2_112-e/Docs/R2-2010540.zip) Correction to pdcch-MonitoringSingleOccasion Ericsson CR Rel-16 38.306 16.2.0 0458 - A NR\_newRAT-Core

**Q5 Do companies agree with the CRs above?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Agree?**  **(Yes or No)** | **Comments** |
| Ericsson (Lian) | Yes (Proponent) |  |
| Qualcomm Incorporated | Yes |  |
| Intel | Yes |  |
| Huawei, HiSilicon | Yes |  |
| Nokia | Yes | Merging with rapporteur correction is preferred as this seems rather editorial? |
| OPPO | Yes |  |
| Apple | Yes |  |
| CATT | Yes |  |
| MediaTek | Yes |  |
| LG | Yes |  |

### 2.1.6 UE capability and cross-slot scheduling for Paging

[R2-2009944](file:///D:/Documents/3GPP/tsg_ran/WG2/TSGR2_112-e/Docs/R2-2009944.zip) UE capability and cross-slot scheduling for Paging Ericsson discussion Rel-15 NR\_newRAT-Core

|  |
| --- |
| **Observation 1**: The UE is required to support K0>0 for DL PDSCH, but the UE may not have IOT tested this, and logs show that (some) REL-15 UEs do not support *dl-SchedulingOffset-PDSCH-TypeA* or *dl-SchedulingOffset-PDSCH-TypeB*.  **Observation 2**: Rel-15 supports the default configurations  **Observation 3**: Default PDSCH time domain resource allocation B for Paging and System Information includes both K0 = 0 and 1.  Therefore it should be assumed that the UE supports K0 = 0 and 1 for Paging and System Information, even when the UE does not indicate support for *dl-SchedulingOffset-PDSCH-TypeA* or *dl-SchedulingOffset-PDSCH-TypeB*:  **Proposal 1**: RAN2 to confirm that Rel-15 UE supports K0 = 0 and 1 for Paging and System Information.  In case proposal 1 is agreeable, it can be discussed further if a clarification is needed (e.g. clarify that the UE supports the default configuration independent from the IOT capability signalling).  In case proposal 1 is not agreeable, RAN2 should discuss if legacy UE supports K0 values in the *pdsch-TimeDomainAllocationList* provided in *pdsch-ConfigCommon* in SIB1 that have not been IOT tested by the UE, but the UE is only paged with K0=0 in the Paging PDCCH. This would enable the NW to use cross-slot scheduling for UEs that have indicated to support it, while using legacy scheduling for UEs that did not indicate support. But then *dl-SchedulingOffset-PDSCH-TypeA* and *dl-SchedulingOffset-PDSCH-TypeB* should be added to the *UERadioPagingInformation* message. |

| ***dl-SchedulingOffset-PDSCH-TypeA***  Indicates whether the UE supports DL scheduling slot offset (K0) greater than 0 for PDSCH mapping type A. | UE | Yes | Yes | Yes |
| --- | --- | --- | --- | --- |
| ***dl-SchedulingOffset-PDSCH-TypeB***  Indicates whether the UE supports DL scheduling slot offset (K0) greater than 0 for PDSCH mapping type B. | UE | Yes | Yes | Yes |

**Q6-1 Do companies agree that “the UE supports K0 = 0 and 1 for Paging and System Information, even when the UE does not indicate support for *dl-SchedulingOffset-PDSCH-TypeA* or *dl-SchedulingOffset-PDSCH-TypeB*?”**

|  |  |  |
| --- | --- | --- |
| **Company** | **Agree?**  **(Yes or No)** | **Comments** |
| Ericsson (Martin) | Yes | RAN1 specified in the L1-UE feature lists that the UE is required to support K0=1 for paging (38.822) independent from FR1 and FR2:  11) DL scheduling slot offset K0=1 for type 1 CSS without dedicated RRC configuration and for type 0, 0A, and 2 CSS |
| Qualcomm Incorporated | Yes |  |
| Intel | Yes | Agree with Proposal 1 in the discussion document. |
| Huawei, HiSilicon | Yes but | Based on RAN1 spec, we share the view that for FR1 K0=0 should be by default by default supported (table for default A) and for FR2 K0=0 and 1 should be by default supported (table for default B). It is independent from capability signalling. So to be more accurate: Rel-15 UE supports K0 = 0 for FR1 and K0 = 0&1 for FR2 for Paging and System Information. |
| Nokia | Yes | Paging is sent in type 2 CSS. SI is sent in type 0 and 0A CSS. So yes, Ericsson proposal is a subset of the RAN1 agreement to the Rel-15 UE capabilities |
| OPPO | Yes |  |
| Apple | Yes |  |
| CATT | Yes |  |
| MediaTek | Yes, but | We don’t know why this is an issue that RAN2 to confirm? Even though the capability bit is captured in 38.306, the design is originated from RAN1 feature table. So, it is better to be confirmed in RAN1. |
| LG | Yes, but | Indeed, this should be confirmed in RAN1 |

**Q6-2 If companies agree with Q6-1, do companies agree that “a clarification is needed (e.g. clarify that the UE supports the default configuration independent from the IOT capability signalling).”**

|  |  |  |
| --- | --- | --- |
| **Company** | **Agree?**  **(Yes or No)** | **Comments** |
| Ericsson (Martin) | Yes | In our understanding the RAN1 requirement specified in 38.822 for K0=1 was “lost in translation”, i.e. this requirements should be captured. |
| Qualcomm Incorporated | Yes, but | In light of the observation 1 in the document, which we agree to, we would like to get the confirmation from RAN2 that it is left to operators’ deployment to make sure there is no IOT problems with legacy UEs that are not IOTed for K0>0. |
| Intel |  | This feature is mandatory without signalling. |
| Huawei |  | RAN1 spec is clear. |
| Nokia | Yes, but | Agree with Intel and QC, it would be up to given deployment. |
| OPPO |  | Similar to the comment from QC/Intel/Nokia, it is can only be handled by deployment. |
| Apple | Yes, but | Similar view as QC. |
| CATT | Yes |  |
| MediaTek | No | We do not see the need to change RAN2 SPEC. |
| LG | No |  |

**Q6-3 If companies disagree with Q6-1, do companies agree that some spec modification is needed, e.g “add *dl-SchedulingOffset-PDSCH-TypeA* and *dl-SchedulingOffset-PDSCH-TypeB* to the UERadioPagingInformation message.”**

|  |  |  |
| --- | --- | --- |
| **Company** | **Agree?**  **(Yes or No)** | **Comments** |
| Ericsson (Martin) | Yes | In case the gNB would like to use K0>1 then the IOT capabilities should be included in the radio paging capabilities. |
| OPPO | No | There might be no much point to discuss the capability in paging message, since this capability relates to SIB reading as well, which means that if the UE does not support this feature, it cannot read the SIB to camp on the cell, so not no follow-up procedure of TAC and paging either. |
|  |  |  |
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## 2.2 Part 2: Intended to progress discussion on agreeable parts

- To be updated after discussion on part 1 -

# 3 Conclusion

- To be updated after discussion on part 1 -

# 4 References

1. [R2-2008710](file:///D:/Documents/3GPP/tsg_ran/WG2/TSGR2_112-e/Docs/R2-2008710.zip) LS on Interpretation of UE Features in Case of Cross-Carrier Operation (R1-2007334; contact: ZTE) RAN1 LS in Rel-15 NR\_newRAT-Core To:RAN2
2. [R2-2009238](file:///D:/Documents/3GPP/tsg_ran/WG2/TSGR2_112-e/Docs/R2-2009238.zip) CR to clarify UE capability in case of cross-carrier operation ZTE Corporation, Sanechips, Ericsson CR Rel-15 38.306 15.11.0 0418 - F NR\_newRAT-Core
3. [R2-2009239](file:///D:/Documents/3GPP/tsg_ran/WG2/TSGR2_112-e/Docs/R2-2009239.zip) CR to clarify UE capability in case of cross-carrier operation ZTE Corporation, Sanechips, Ericsson CR Rel-16 38.306 16.2.0 0419 - A NR\_newRAT-Core
4. [R2-2009162](file:///D:/Documents/3GPP/tsg_ran/WG2/TSGR2_112-e/Docs/R2-2009162.zip) Correction to BWP capabiltiy descriptions Nokia, Nokia Shanghai Bell CR Rel-15 38.306 15.11.0 0416 - F NR\_newRAT-Core
5. [R2-2009163](file:///D:/Documents/3GPP/tsg_ran/WG2/TSGR2_112-e/Docs/R2-2009163.zip) Correction to BWP capabiltiy descriptions Nokia, Nokia Shanghai Bell CR Rel-16 38.306 16.2.0 0417 - A NR\_newRAT-Core
6. [R2-2009516](file:///D:/Documents/3GPP/tsg_ran/WG2/TSGR2_112-e/Docs/R2-2009516.zip) Correction of the description of ue-SpecificUL-DL-Assignment Apple CR Rel-15 38.306 15.11.0 0430 - F NR\_newRAT-Core
7. [R2-2009517](file:///D:/Documents/3GPP/tsg_ran/WG2/TSGR2_112-e/Docs/R2-2009517.zip) Correction of the description of ue-SpecificUL-DL-Assignment Apple CR Rel-16 38.306 16.2.0 0431 - A NR\_newRAT-Core
8. [R2-2010537](file:///D:/Documents/3GPP/tsg_ran/WG2/TSGR2_112-e/Docs/R2-2010537.zip) Correction to the use of simultaneous CSI-RS resources Ericsson CR Rel-15 38.306 15.11.0 0455 - F NR\_newRAT-Core
9. [R2-2010536](file:///D:/Documents/3GPP/tsg_ran/WG2/TSGR2_112-e/Docs/R2-2010536.zip) Correction to the use of simultaneous CSI-RS resources Ericsson CR Rel-16 38.306 16.2.0 0454 - A NR\_newRAT-Core
10. [R2-2010541](file:///D:/Documents/3GPP/tsg_ran/WG2/TSGR2_112-e/Docs/R2-2010541.zip) Correction to pdcch-MonitoringSingleOccasion Ericsson CR Rel-15 38.306 15.11.0 0459 - F NR\_newRAT-Core
11. [R2-2010540](file:///D:/Documents/3GPP/tsg_ran/WG2/TSGR2_112-e/Docs/R2-2010540.zip) Correction to pdcch-MonitoringSingleOccasion Ericsson CR Rel-16 38.306 16.2.0 0458 - A NR\_newRAT-Core
12. [R2-2009944](file:///D:/Documents/3GPP/tsg_ran/WG2/TSGR2_112-e/Docs/R2-2009944.zip) UE capability and cross-slot scheduling for Paging Ericsson discussion Rel-15 NR\_newRAT-Core