**3GPP TSG-RAN WG2 Meeting #115-e *R2-21xxxxx***

**E-Meeting, 12th – 27th August, 2021**

**Agenda item: 8.17.2**

**Source: Intel Corporation**

**Title: Report of [AT115-e][052][feMIMO] RRC modelling (Intel)**

**Document for: Discussion and Decision**

# Introduction

During on-line session, it appears that companies consider different options to model RRC to support inter-cell beam management operation. Although we still need more information/progress from RAN1 discussion, it would be also worthwhile to list up all possible options from RAN2 point of view and identify initial level of the main characteristics/pros/cons.

* [AT115-e][052][feMIMO] RRC modelling (Intel)

 Scope: Objective to list the main RRC modelling options and understand related limitations / pros / cons. If possible weed out unreasonable options if any.

 Intended outcome: Report (Report to be submitted also to next meeting to serve as a baseline for discussions).

 Deadline: EOM, Can CB W2 Wed or W2 Fri to address issues on-line if needed

# Some considerations before RRC modelling discussion

Before we discuss the specific modelling option, we would like to discuss some aspects to have a common understanding on the current status and to build up common functionalities/aspects that might affect RRC modelling and comparison of options.

**Discussion 1: What objective we are discussing now?**

* Objective 1: inter-cell beam management
	+ Based on the updated WID, the UE transmit or receive only one serving cell.
	+ It can be assumed as dynamic point selection (DPS) i.e. different beam/TRP will be selected in each time period dynamically.
	+ RAN1 is still under discussion on many aspects, e.g. what channels (mainly common channel of TRP with different PCI) should be applicable from TRP with different PCI (i.e. non-serving cell), how many inter-cell TRPs should be considered, how switching is supported in DL and UL, etc.
	+ TCI framework: Unified TCI framework will be used. One TCI state can be linked to both DL and UL, or either DL or UL. We can confirm with RAN1.
	+ Synchronization among TRPs:  RAN1 has not discussed.
	+ BFD: RAN1 has not discussed BFD in objective 1.
* Objective 2: inter-cell mTRP operation
	+ Since it assumes multi-PDSCH reception and multi-DCI, simultaneous DL reception from multiple cells can be supported.
	+ However, simultaneous transmission in uplink is not considered. It is not yet known whether DPS in uplink is assumed or not in this scenario.
	+ TCI framework: RAN1 has not discussed but assume same as Rel-16. DL and UL are separated in Rel-16.
	+ Synchronization among TRPs: timing difference is within CP. Same TA is assumed.
	+ BFD: BFD agreement is for inter-cell mTRP operation.

RAN1’s discussions on Objective 1 and Objective 2 are separated. It is understood that RAN1 also doesn’t discuss clearly what and how the above scenarios are different. Nevertheless, considering RAN1 discussion status and structure of WID, it is also probable that RAN1 doesn’t combine two objectives. From RRC point of view, DPS and simultaneous reception is the same in the sense that RRC needs to configure TRP with different PCI before DPS/simultaneous reception is enabled in MAC/PHY layer.

On the other hand, RAN1 has been discussing those two objectives separately. It would be also reasonable for RAN2 to also differentiate two objectives for the time being.

In this email discussion, since all contributions mainly focus on inter-cell beam management objective, we will also discuss RRC modelling only based on inter-cell beam management objective.

**Question 1: Do you agree that RAN2 should start discussion on RRC modelling only based on inter-cell beam management objective?**

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| Company | Yes/No | Comments |
| Ericsson | neutral | Questions in this sheet seem to be common to both.One thing to note on Rel-17 mTRP operation is that it will be on top of Rel-16 mTRP and some of those parameters are assumed to be configured. There may also be more restrictions on how parameters can be among TRPs. |
| Xiaomi |  | It is probably too early to only consider “inter-cell beam management objective”. As we are asking clarification questions for RAN1, probably RAN2 can wait for one meeting cycle. |
| OPPO | Yes | Our understanding is that for inter-cell mTRP there is no such modelling issue and they take TRP with another PCI as QCL resource and that’s it. |
| Nokia, Nokia Shanghai Bell |  | The question is a bit misleading: **We should discuss common functionality, NOT RAN1 agenda items!** **- Functionality is more important that "RAN1 agenda items":** It doesn't really matter how RAN1 discusses the topics in their agenda items. Functionality should drive the work, NOT the agenda items. Agenda is only there to split the work to manageable pieces and drive progress. Since there is only one RRC, RAN2 needs to take a look at the whole picture anyway.**- Inter-cell beam management objective** is common to multi-TRP and single-TRP. Similarly, the unified TCI framework is common to multiple objectives, so we have to take it into account in all of them.- **Design should consider all aspects of the work**, including the multi-TRP ones. Hence, while we can (and should!) discuss what we can already now, the whole goal of this question can be interpreted as an attempt to deprioritize the multi-TRP work. That certainly should not be the goal of anyone. |
| Samsung |  | We also think it is very early to consider RRC modelling of “inter-cell beam management “either “only” or “both with inter-cell mTRP operation” without clear understanding of functionality.  |

**Discussion 2: What RRC parameters will be required for TRP with different PCI?**

* Measurement related
	+ At least CSI measurement/reporting): SSB/CSI-RS resource
	+ RLM: RAN1 has not discussed.
	+ BFD related parameters: RAN1 has not discussed BFD for inter-cell beam management.
* Dedicated channels:
	+ TCI state information for DL and/or UL
	+ There are many parameters for dedicated channels as cell level/BWP level information. But, before RAN1 provides, we cannot conclude what RRC parameters are required separately for TRP with different PCI. It is also possible that the same resource/channel configuration is assumed for multiple TRPs, in which case only TCI information is needed
* Common channels:
	+ PRACH?
* What else?

**Question 2: Do you agree that at least TCI state information is required for TRP with different PCI?**

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| Company | Yes/No | Comments |
| Ericsson | yes |  |
| Xiaomi | Yes |  |
| OPPO | Yes |  |
| Nokia, Nokia Shanghai Bell | Yes but see comments | TCI state information is required but any PxxCH parameters are also required (depending on RAN1 information). We shouldn't start thinking nothing is required and base the design on only that. |
| Samsung | Yes |  |

**Question 3: Do you agree that until RAN1 provides the required RRC parameters, RAN2 should assume that RRC parameters for dedicated channels/common channels may or may not be needed for TRP with different PCI?**

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| Company | Yes/No | Comments |
| Ericsson | ? | Is the question may be assume, yes/no. Or may not be assumed yes/no, or really may or may not yes/no?We think it is more according to the WID to assume other parameters are the same. RAN1 will point out explicitly which parameters are different. Even it is DPS, UE is measuring the other TRP and it is also configured for the UE, thus UE needs to be able to maintain the parameters(and what ever channel is implied) for both TRPs. This is very much RAN1 discussions as is what does the “maintain” in practice mean.This may also be different for BM and for mTRP operation where there may be stricter requirements on how parameters can be set between the TRPs(regardless of same or different PCI) |
| Xiaomi |  | We would like to firstly see the candidate solutions for the ASN.1 structure of configuring the TRP with different PCI.  |
| OPPO |  | If RAN2 decide on modelling then we should answer this question and tell RAN1. The cell/BWP approach obviously assumes different configuration at least for dedicated channel. But since RAN2 is hesitating and try to get some information from RAN1 to make decision, I guess RAN2 can’t answer this question now. |
| Nokia, Nokia Shanghai Bell | Separate parameters for each TRP | The question is very unclear: Answering "Do you agree that A may or may not be required" is pretty much impossible.As baseline, RAN2 should assume each TRP sets its own parameters and configurations can be different. That covers all cases and avoids any pitfalls with common parameters. |
| Samsung |  | Agree that the baseline would be the separate configuration for each TRP because it would be the future-proof way when serving cell change will be introduced in the future release. But, we first want to see RAN1 decision on the functionality required for this release. |

**Question 4: Please add any missing parameters that might be considered in the discussion?**

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| Company | Comments |
| Ericsson | SSB time-domain positions, SSB transmit power (if more, we expect these to be in the RAN1 excel) |
| Nokia, Nokia Shanghai Bell | **BFD/RLM:** RAN1 has discussed BFD for multi-TRP, which we would assume applies also for inter-cell beam management. If we have no BFD, how does the operation work when beam fails? If UE does BFD for the serving cell, even when DPS'd to the assisting cell, can UE even detect beam failure and what are the UE actions upon beam failure? Same applies also for RLM, as it's expected RAN4 will have to discuss RLM anyway.**RRM:** The measurement impacts also need to be discussed in RAN2: Since UE is doing L1 measurements to DU, what happens if DU changes beam but CU thinks (based on earlier L3 measurements) HO is needed? |
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**Discussion 3: how would TRP with different PCI be different from SCell or dedicated BWP operation?**

This is to understand further about “TRP with different PCI” by comparing with SCell/dedicated BWP before we discuss the modelling options with an initial list of functionalities.

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|  | SCell | Dedicated BWP | TRP with different PCI |
| Common channels (SIB, Paging) | No | Yes if common search space is configured.  | No |
| RLM | No | Yes on active BWP | No |
| RRM | Yes | Yes | No |
| Simultaneous TX/RX | Yes (multiple SCells can be activated with PCell) | No (only one BWP is activated)  | No (only one TRP is activated assuming each TRP is associated with different PCI) |
| PHY configuration | Independent configuration of all PHYBoth BWP specific and BWP common parameters | BWP specific PHY configuration  | TCI state information Other PHY configuration (FFS) |
| Activation/switch | RRC or MAC | L1 or MAC timer | L1 or MAC (FFS) |

**Question 5: Do you agree the above aspects in the table can be basis to characterize TRP with different PCI?**

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| Company | Yes/No | Comments |
| Ericsson | Yes with additions | Another aspect is the user plane discussion although the topic here is RRC modelling. With SCell model, separate HARQ entity is assumed and with option 2 and 3 (and4) common HARQ entity is assumed. |
| Xiaomi | No | 1. For RRM, serving MO is per frequency which already includes the measurement for the serving PCI and the TRP of different PCI.
2. For simultaneous Rx/Tx, some inputs from RAN1 is probably needed.
 |
| OPPO | Not exactly | The line “Simultaneous TX/RX” is bit misleading. If the reference is PCell, then all should be marked as yes. If the reference is serving TRP, then all should be marked as no. As for activation/switch line, BWP switch can be also done via RRC and we should put L1(FFS) for scell which is to be discussed under this agenda item. |
| Nokia, Nokia Shanghai Bell | Yes with additions | RLM/RRM are still needed since UE is only using one beam at a timePHY configuration should also consider TRP-specific PxxCH configuration. Otherwise, RLM might be declared because the serving cell beam is bad but assisting cell beam is being used so there's no problem. And the same problem can occur for RRM: Since both DU and CU now receive RRM(-like) measurements, some coordination is necessary and network should be able to configure which measurements are sent to where. |
| Samsung | Yes, but | We are not sure that simultaneous Rx/Tx is not supported in TRP with different PCI, we need to wait RAN1 response.RLM/RRM is also questionable for us but If it is very much like intra-PCI TRP change, it may be possible to decide purely based on L1 feedback i.e. no RLM/RRM. |

**Question 6: Please add missing aspects that might be helpful if we consider to discuss the modelling options?**

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| Company | Comments |
| Ericsson | About PHY configuration, one should be perhaps more explicit in noting that in both SCell and dedicated BWP options the phy parameters are potentially different and each parameter that cannot be different needs to be separately specified that there is a limitation. How would we do this in practice? Two options:1. Take RAN1 excel and see which aspects have been specified to be “per TRP” and make the rest automatically same by adding in EACH field description the limitation.
2. Take RAN1 excel as baseline, have RAN2 discussions and filetr out parameters we want to send LS about to RAN1 and ask whether or not one or more of those could be different.

This would be needed for intercell mTRP and BM separately.With the third option, TRP with different PCI, we do not see the need for the above. |
| Nokia, Nokia Shanghai Bell | MAC operation needs to be considered as well with each option: We assume a MAC entity operation is not changed in any of the cases, but it's not clear how the MAC CEs are impacted.  |
| Samsung | Same view with Nokia, MAC operation should be considered.Same MAC operation (i.e. no need for separate MAC configuration for TRP with different PCI) is always simple so we also think it would be the baseline. But, we can also consider separate configuration for some operations on TRP with different PCI e.g. whether to continue HARQ or clear, whether to trigger PHR or not. |

# Modelling of inter-cell beam management/inter-cell mTRP

## Option 1: Cell

In this option, TRP with different PCI is defined as an independent cell the following aspects are summarized based on [R2-2107948], [R2-2108478], [R2-2108632].

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| * This new cell is always “associated” with a legacy serving cell via the inter-cell mTRP operation. In Rel-17, the two cells share the same frequency.
* The secondary TRP cell (Assisting Cell) can have same or different C-RNTI than the associated primary cell (Main cell).
* The configuration of the secondary TRP cells (Assisting Cell) for addition, modification, and release is done by RRC signaling.
* Every legacy serving cell (SpCell or SCell) can have an associated secondary TRP cell.
* When Assisting Cell is used for UL, RLM should follow Assisting Cell signals (FFS whether this is part of Main cell (legacy serving cell) or as separate Assisting Cell RLM).
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Question **7**: Please share your view on the potential characteristics on modelling TRP with different PCI as “a cell”. You may just agree on the above description or add missing aspects if any. Please note that we will not discuss the exact terminology here i.e. there is no need to discuss the name “Assisting cell” or “the secondary TRP cell”.

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| Company | Comments |
| Ericsson | The phy parameters for UL, DL common and dedicated are potentially different and each parameter that cannot be different needs to be separately specified that there is a limitation. How would we do this in practice? Two options:1. Take RAN1 excel and see which aspects have been specified to be “per TRP” and make the rest automatically same by adding in EACH field description the limitation.
2. Take RAN1 excel as baseline, have RAN2 discussions and filetr out parameters we want to send LS about to RAN1 and ask whether or not one or more of those could be different.

mTRP and BM may be different on this.Additionally, RAN2 would need to check which all Rel-16 MAC CEs are suppose to be used also in Rel-17 operation. E.g. if the PCI is associated to TCI state, with Option3/option4, it would not be visible in the TCI state id space and thus same MAC CE can be assumed(given the ID space is not extended) . With suggested SCell modeling it would need to be checked. *This especially when the MAC CE is used with serving cell list for legacy CA context.*  |
| OPPO | We share 1/2/4 bullets above. As for the C-RNTI, not sure different C-RNTI matters. Cells belonging to same cell group supposes to share same C-RNTI in current spec and they are differentiated naturally by frequency. Assisting cell share same frequency but they can be differentiated by CORESET and relevant search space configuration implicitly.As for RLM, not sure it is necessary. The pre-condition is that serving cell is not changed i.e. it is always serving including RLM. |
| Nokia, Nokia Shanghai Bell | Proponent - we see that with this option, we just allow the "assisting cell" to have all if its parameters different. That ensures we don't need to discuss which parameters can be different but can just refer to RAN1 specifications as they are depending on which beam UE uses. We would also like to clarify that the UE capability aspects (i.e. whether UE can support assisting cell for any serving cell) still need to be discussed separately. These are only about configuration, it's quite likely UE cannot support assisting cells for each and every serving cell with multiple serving cells. |
| Samsung | This approach would be the general approach and future-proof way if serving cell change by L1/L2 signalling will be introduced in the next release. |

Question **8**: What limitation/pros/cons are expected?

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| --- | --- |
| Company | Comments |
| Ericsson | Release 17 is not going to be long enough to finish this option. |
| OPPO | It is relatively more complicated compared to option2 and option3, but with more flexibility of radio configuration. Plus it could form a good base for future evolution.  |
| Nokia, Nokia Shanghai Bell | **Pros:** Simple to configure (network just gives the entire cell configuration to UE), future-proof (e.g. for L1 mobility), no need to discuss each feature separately (i.e. every TRP can have its own configuration without needing to enforce heavy restrictions at network side)**Cons:** Signalling overhead (depending on how the signalling is modelled), requires focusing the work on essentials |
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## Option 2: BWP

In this option, TRP with different PCI is modelled as additional BWP. The following aspects are summarized based on [R2-2107585] and [R2-2108632].

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| * Configure the different TRP as the different BWP, and the TRP activation/deactivation can be achieved via the BWP switching mechanism.
* the common configuration would be kept for source cell i.e. UE keep monitoring the source cell’s common channel.
* For the TRP with different PCI, it has the full set of the PxxCH configuration, and the full set of common and dedicated configuration. Switching to TRP with different PCI is based on L1 signaling
 |

Question **9**: Please share your view on the potential characteristics on modelling TRP with different PCI as a “BWP”. You may just agree on the above description or add missing aspects if any. Please note that we will not discuss the exact terminology here.

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| Company | Comments |
| Ericsson | The phy parameters for dedicated BWP are potentially different and each parameter that cannot be different needs to be separately specified that there is a limitation. How would we do this in practice? Two options:1. Take RAN1 excel and see which aspects have been specified to be “per TRP” and make the rest automatically same by adding in EACH field description the limitation.
2. Take RAN1 excel as baseline, have RAN2 discussions and filetr out parameters we want to send LS about to RAN1 and ask whether or not one or more of those could be different.

This is little bit less work than with SCell options from parameter limitation perspective.However, If we use this for intercell mTRP as well UE would need to consider TWO BWPs active at the same time. This needs separate question to RAN1.Additionally, RAN2 would need to check which all Rel-16 MAC CEs are suppose to be used also in Rel-17 operation. E.g. if the PCI is associated to TCI state, with Option3/option4, it would not be visible in the TCI state id space and thus same MAC CE can be assumed(given the ID space is not extended) . With BWP operation it would need to be checked.  |
| OPPO | For 2nd bullet, whether common channel configuration is configured in TRP with different PCI is up to network. so the wording “would” need be changed to be “could”.For 3rd bullet, We think normal BWP switch including RRC, MAC and L1 can all be used which is also expressed in 1st bullet |
| Nokia, Nokia Shanghai Bell | - **Multiple BWP support is required** from UE and this may increase the need for BWPs- **No cell-specific configurations** as per-BWP configuration doesn't allow any cell-specific parameters to be different (e.g. anything configured by *ServingCellConfig*), which makes it more difficult to use the feature (by forcing many parameters to be the same)- **Different PCI** still has to be explicitly indicated per BWP (somehow), so we will end up repeating the same configuration at multiple levels. |
| Samsung | The new concept of BWP operation is required as Nokia pointed out above i.e. multiple BWP support by UE. This is quite violate the NR basic concept. |

Question **10**: what limitation/pros/cons are expected?

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| Company | Comments |
| Ericsson | Release 17 is not going to be long enough to finish this option. |
| OPPO | We think BWP approach doesn’t mean there are two active BWPs but just only one. Because the maximum number of dedicated BWP is limited to 4. It means there could be one less BWP configuration on the serving TRP |
| Nokia, Nokia Shanghai Bell | **Pros:** Reuse of BWP switching, allows per-TRP configuration of PHY**Cons:** Ties the feature to BWP switching, requires multiple parameters (e.g. C-RNTI) to be the same for each TRP, difficult to extend in the future for L1 mobility, may require two active BWPs / serving cell (which would impact also RAN1) |

## Option 3: beam resource (e.g. TCI state, QCL-info)

In this option, TRP with different PCI is modelled as a dedicated resource to enable separate beam ie. separate TCI-state/QCL-info. The following is summarized based on [R2-2107906], [R2-2108632], [R2-2108656], [R2-2108807].

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| * The additional SSB set(s) from non-serving cell (TRP with different PCI) is configured within the serving cell configuration and be associated with an index. This index can then be used associating TCI states, CSI measurement configurations, potential UL configurations, etc to the additional SSB set (PCI).
* TCI state is also configured in serving cell configuration but assigned with SSB index associated to the different PCI.
* In inter-cell multi-TRP operation, the CORESETPoolIndex with value 0 is associated with the serving cell, while CORESETPoolIndex with value 1 is associated with the non-serving cell.
* All other configuration in BWP could be shared by neighbor cell except for PHY dedicated channels (PxxCH)
* Cell-specific parameters for neighbor TRPs/Cells are shared with the source cell or cell-specific parameters are not needed on the neighbor TRPs/Cells e.g. RACH is not needed on the neighbor cell and RACH is triggered by PDCCH-command if needed. It is assumed that TA is always aligned between source and neighbor cell.
* SSB related information of the non-serving PCI is included in the CSI configuration to configure CSI for TRP with different PCI.
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Question **11**: Please share your view on the potential characteristics on modelling TRP with different PCI as a “beam resource”. You may just agree on the above description or add missing aspects if any. Please note that we will not discuss the exact terminology here.

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| Company | Comments |
| Ericsson | This would coincide with what we need to model in RRC with Rel-17 mTRP and BM with one PCI. Only difference is the aspect of adding SSB(PCI )set in serving cell configuration, we can decide cell group level or in each PCell and SCell. These sets have index and this index can be assoctaited to TCI state, CSI(L1 measurements) etc. To our understanding this has been discussed in RAN1. |
| Xiaomi | We think that this modelling following the Rell-16 mTRP structure has less impact in the ASN.1 and other functions.It is too early to decide the “CORESETPoolIndex”. And it is also too early to decide the RACH/TA impacts without RAN1 inputs. |
| OPPO | We understand this approach is to mimic Rel16 multi-beam management scheme with the SSB(s) associated with different PCI. But the description need be improved to align all the terms (non-serving PCI, neighbour cell, neighbour TRP…) and remove very detail description (index approach for TCI states/SSB and CORESET etc.) since they are still under RAN1 discussion.  |
| Nokia, Nokia Shanghai Bell | - **Network coordination is quite heavy** with this solution as it basically requires network to coordinate every PHY parameter, which is not always possible.- **mDCI mTRP may not work:** Using CORESETPoolIndex seems difficult and only applies for multi-DCI multi-TRP, and even there makes the operation difficult. Even in Rel-16 the indexes were not tied together like this.**Overall**, we are not so sure this solution is any simpler thamn the others. It seems like we will anyway need to duplicate lot of information at multiple levels and "marking" those to be intended for the multi-beam use, which will be messy and not allow inter-operability easily.  |
| Samsung | This option is quite aligned with the required operation in Rel-17 but not sure it can be easily extended to the further release i.e. for serving cell change by L1/L2 signalling. |

Question **12**: what limitation/pros/cons are expected?

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| Company | Comments |
| Ericsson | With this option it is very easy to make sure the Rel-17 configuration works as it will assume Rel-16 existing and reuse some of those configuration settings, and MAC CEs etc. |
| OPPO | If we go for this approach it is simple but it is also bit redundant with work in inter-cell mTRP (objective 2 in RAN1’s MIMO WID).  |
| Nokia, Nokia Shanghai Bell | **Pros:** Least amount of signalling among the options**Cons:** Requires all PHY parameters to be the same for each TRP, RLM/BFD resources need to be the same for each TRP, complicated multi-DCI multi-TRP operation (as it basically replaces that operation with inter-cell beam management), multiple SSBs as QCL source may not be supported, may not work with multi-TRP (which is one objective of the WI) |

## Option 4: new structure

In [R2-2107415], a new approach is proposed, in which a new IE (e.g. *NonServingCellConfig*) is defined to include all non-serving cell information (i.e. TRP with different PCI).

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| * Non-serving cell SSB information (at least SSB time domain position, SSB transmission periodicity, SSB transmission power) are needed in inter-cell MTRP operation:.
* PCI of non-serving cell is included in the new IE (e.g. NonServingCellConfig) for non-serving cell.
* An index of non-serving cell with corresponding configurations is introduced to associate with TCI state.
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Question **13**: Please share your view on the potential characteristics on modelling TRP with different PCI as “new structure”. You may just agree on the above description or add missing aspects if any. Please note that we will not discuss the exact terminology here.

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| Company | Comments |
| Ericsson | This would be in cell group config level. It is seen as one option of option3. It is possible, though better naming could be considered. Like “TRP with separate PCI”. Even this name is not great, it would be good to avoid “nonserving” as the TRP is serving the UE, or cell, as it is not a cell. |
| OPPO | Our understanding is this is actually align with option3 with more detail parameters listed in one new structure |
| Nokia, Nokia Shanghai Bell | This is more or less similar proposal as option 1, just putting the configuration at *ServingCellConfig* - level.  |

Question **14**: what limitation/pros/cons are expected?

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| Company | Comments |
| Ericsson | Pros cons are to us: at cell level the TRP with another PCI is more like TRP under same PCI which makes sense as it seems to be same/similar operation from phy perspective regardless of whether in under same or different PCI. However, it may turn out this is not true and the TRP with another PCI has e.g. more limitations on certain operation etc etc. Or, e.g. if the BFD/BFR really is only for mTRP operation when the other TRP has another PCI. Then it would make probably more sense to do it like in Option4. |
| Nokia, Nokia Shanghai Bell | See solution 1 |
|  |  |

# Conclusion

# References

1. R2-2107948 Multi-cell support for multi-TRP Nokia, Nokia Shanghai Bell discussion Rel-17 NR\_feMIMO-Core
2. R2-2107257 Discussion on inter cell beam management OPPO discussion Rel-17 NR\_feMIMO
3. R2-2107414 Discussion on inter-cell beam management vivo discussion Rel-17 NR\_feMIMO-Core
4. R2-2107554 Discussion on multi-TRP operation Intel Corporation discussion Rel-17 NR\_feMIMO-Core
5. R2-2107585 L1/L2-centric inter-cell beam management Apple discussion Rel-17 NR\_feMIMO-Core
6. R2-2107906 Discussion on support of inter-cell multi-TRP operation Lenovo, Motorola Mobility discussion Rel-17
7. R2-2108005 On Inter-Cell beam management CATT discussion Rel-17 NR\_feMIMO-Core
8. R2-2108269 Discussion on the definition of the non-serving cell for the LS-in from RAN4 and RAN3 ZTE Corporation discussion Rel-17 NR\_feMIMO-Core
9. R2-2108333 UL Timing Alignment for Inter-cell multi-TRP like model DENSO CORPORATION discussion Rel-17 NR\_feMIMO-Core
10. R2-2108442 Support of inter-cell beam management Huawei, HiSilicon discussion Rel-17 NR\_feMIMO-Core
11. R2-2108478 Modeling of Inter-cell mTRP Qualcomm Incorporated discussion Late
12. R2-2108632 Considerations on the support of inter-cell beam management Samsung discussion NR\_feMIMO-Core
13. R2-2108656 Inter-cell mTRP LG Electronics discussion Rel-17
14. R2-2108761 Intial Discussion on potential RAN2 impact from Inter-cell mTRP ZTE Corporation, Sanechips discussion Rel-17 NR\_feMIMO-Core
15. R2-2108802 Serving cell measurement for mTRP Xiaomi Communications discussion Rel-17 NR\_feMIMO-Core
16. R2-2108807 On non-serving PCI related aspects of mTRP operation Ericsson discussion NR\_feMIMO-Core
17. R2-2107369 Discussion on the issue of L1L2 mobility Spreadtrum Communications discussion Rel-17
18. R2-2107415 Discussion on inter-cell MTRP operation vivo discussion Rel-17 NR\_feMIMO-Core