(NOTE: Track changes relative to v009\_Mod)

Based on the above observation the following moderator **proposals** are made:

* [Issue 1] For Rel.17 NR FeMIMO, on the unified TCI framework
  1. Support joint/combined TCI for DL and UL, as well as joint TCI pool for DL and UL – based on and analogous to Rel.15/16 DL TCI framework
     + The term “TCI” at least comprises a TCI state that includes at least one source RS to provide a reference (UE assumption) for determining QCL and/or spatial filter
     + The source reference signal(s) in one TCI or >1 TCIs provide common QCL information at least for UE-dedicated reception on PDSCH and all CORESETs in a CC
     + The source reference signal(s) in one TCI or >1 TCIs provide a reference for determining common UL TX spatial filter(s) at least for dynamic-grant/configured-grant based PUSCH, all dedicated PUCCH resources in a CC,
       - Optionally, this UL TX spatial filter can also apply to all SRS resources in resource set(s) configured for antenna switching/codebook-based/non-codebook-based UL transmissions
       - FFS: applicability of this UL TX spatial filter to SRS configured for beam management (BM)
       - FFS: PUSCH port determination based on the TCI, e.g., to be mapped with SRS ports analogous to Rel.15/16
     + FFS (RAN1#103-e): Details on extension to intra- and inter-band CA
     + FFS (RAN1#103-e): Extended use case of unified TCI framework beyond facilitating common beam updates
     + FFS (RAN1#103-e): The supported number of active TCI states considering factors such as multi-TRP and issue 6.2
  2. In RAN1#103-e, investigate, for the purpose of down selection, the following alternatives for accommodating the case of separate beam indication for UL and DL (e.g. MPE event)
     + Alt1. Utilize the joint TCI to include references for both DL and UL beams
     + Alt2. Support/introduce a (new) UL TCI separate from the current (Rel.15/16) DL TCI
     + Note: For either Alt1 or Alt2, the same pool of TCI states is utilized
     + FFS (RAN1#103-e): Details on extension to intra- and inter-band CA
     + Note: This may be related to issue 5 as well as other reasons for different TCIs such as network flexibility/scheduling
  3. Support the use of SSB/CSI-RS for BM and/or SRS for BM as source RS to determine a UL TX spatial filter in the unified TCI framework
     + Whether the UL TX spatial filter corresponds to UL TCI (separate from DL TCI) depends on the outcome of 1b) above
  4. In RAN1#103-e, decide if SRS for BM can be configured as a source RS to represent a DL RX spatial filter in the unified TCI framework
  5. In RAN1#103-e, decide/finalize all other parameters included in or concurrent with (but not included in) the TCI, e.g. UL-PC-related parameters (involving P0/alpha, PL RS, and/or closed loop index), UL-timing-related parameters
  6. In RAN1#103-e, identify issues pertaining to alignment between DL and UL default beam assumptions using the unified TCI framework
* [Issue 2] For Rel.17 NR FeMIMO, on L1/L2-centric inter-cell mobility:
  1. In RAN1#103-e, finalize scope and use cases for L1/L2-centric inter-cell mobility, including:
     + Applicability in various CA setups such as intra-band and inter-band CA
     + Use cases in comparison to Rel.15 L3-based handover (HO) taking into account potential extension of DAPS-based Rel.16 mobility enhancement to FR2-FR2 HO
     + The extent of RAN2 impact (MAC CE, RRC)
     + Network architecture, e.g. NSA vs. SA, inter-RAT scenarios
  2. In RAN1#103-e, depending on the outcome of 2a), further identify additional components –along with the associated alternatives –required for supporting inter-cell mobility based on the same unified TCI framework as that for intra-cell mobility (including dynamic TCI state update signaling), including
     + Method(s) for incorporating non-serving cell information associated with TCI
     + Method(s) for DL measurements and UE reporting (e.g. L1-RSRP) associated with non-serving cell(s)
     + UE behavior for reception of signals, control and data channels associated with non-serving cell(s)
     + UL-related enhancements, e.g. related to RA procedure including TA
     + Event-driven mechanism for L1/L2-centric inter-cell mobility
* [Issue 3] For Rel.17 NR FeMIMO, on dynamic TCI state update signaling medium:
  1. In RAN1#103-e, investigate, for the purpose of down selection, the following alternatives:
     + Alt1. DCI
     + Alt2. MAC CE
     + Note: Combination between DCI and MAC CE for, e.g. different use cases or control information partitioning can also be considered
     + Note: The study should consider factors such as feasibility for pertinent use cases, performance (based on at least the agreed EVM), overhead, latency, reliability including the support of retransmission
     + Note: This may be related to outcome of issue 1a), 1b), and 6a)
  2. In RAN1#103-e, depending on the outcome of 3a), identify candidates for more detailed design issues for the dynamic TCI state update such as
     + Exact content
     + Signaling format, including the support of UE-group (in contrast to UE-dedicated) signaling
     + Reliability aspects including the support of retransmission
* [Issue 4] For Rel.17 NR FeMIMO, on MP-UE assumption to facilitate fast UL panel selection:
  1. The following assumptions are used:
     + In terms of RF functionality, a UE panel comprises a collection of TXRUs that is able to generate one analog beam (one beam may correspond to two antenna ports if dual-polarized array is used)
     + UE panels can constitute the same as well as different number of antenna ports and EIRP
     + For each UE panel, it can comprise an independent unit of PC and/or TA.
     + No beam correspondence across different UE panels
     + A UE panel may be used for both DL and UL operation, or only for UL operation (due to e.g., MPE event)
  2. In RAN1#103-e, identify candidate signaling schemes for the following:
     + NW to MP-UE (taking into account potential extension of the unified TCI framework in issue 1)
     + MP-UE to NW
* [Issue 5] For Rel.17 NR FeMIMO, on MPE mitigation (that is, minimizing the UL coverage loss due to the UE having to meet the MPE regulation), in RAN1#103-e:
  1. If needed, identify candidate solutions to be down-selected in future meeting(s). The following sub-categories can be used:
     + CAT0. The need for specification support for MPE event detection and, if needed, candidate solutions
     + CAT1. The need for UE reporting associated with a potential MPE event if the UE selects a certain UL spatial resource, e.g., corresponding to DL or UL RS
     + CAT2. The need for NW signaling in response to the reported MPE event (taking into account issue 1) and UE behavior after receiving the NW signaling
     + Note: RAN4 has agreed to specify P-MPR reporting (cf. CRs for TS 38.101/102/133) which can be used as a baseline scheme for further enhancement
     + Note: This may be related to outcome of issue 4b)
  2. Companies are encouraged to submit evaluation results based on the agreed EVM to justify the benefits of the candidate solutions
* [Issue 6] For Rel.17 NR FeMIMO,
  1. Add another category for beam acquisition (including beam tracking and refinement) latency reduction –especially in high-speed scenarios – which includes performing study and, if needed, specifying at least the following [further sub-categorization is to be done in RAN1#102-e to facilitate more structured discussion in RAN1#103-e]:
     + Joint DL TX/RX beam refinement (P2/P3) and beam sweeping using ‘UE-group TCI’
       - Note: The relation with existing features such as beam-group reporting should be considered
     + Joint DL TX/RX beam refinement (P2/P3) and beam sweeping by using CSI-RS resources with partial repetition within a CSI-RS resource set across DL spatial domain TX filters.
     + Joint UL TX/DL RX beam refinement (joint P2/U3) based on CSI-RS with repetition across DL spatial domain TX filters and aperiodic SRS transmission
     + Predictive TCI state update (including potential MPE event indication)
     + Enabling DL TX/RX beam refinement (P2/P3) via additional QCL with A-TRS
     + SSB-based beam indication to facilitate beam refinement and selection, e.g. via MSG3 on PRACH during initial access
     + Dynamic TCI for periodic and/or aperiodic RS
     + Intra-symbol beam sweeping based on 1-port CSI-RS for BM
     + Dynamic TCI state/QCL source update directly from L1-RSRP measurement report with gNB control/confirmation
     + Simultaneous PL RS update across CCs
  2. Partial BFR will be handled in ITEM 2c (BM enhancement for mTRP)