# Topic #1: General aspects and work plan

#### Issue 1-1: RAN4 UE feature list for event triggered L1 reporting

**Agreement:**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Features** | **Index** | **Feature group** | **Components** | **Prerequisite feature groups** | **Need for the gNB to know if the feature is supported** | **Applicable to the capability signalling exchange between UEs (V2X WI only)”.** | **Consequence if the feature is not supported by the UE** | **Type**  **(the ‘type’ definition from UE features should be based on the granularity of 1) Per UE or 2) Per Band or 3) Per BC or 4) Per FS or 5) Per FSPC)** | **Need of FDD/TDD differentiation** | **Need of FR1/FR2 differentiation** | **Capability interpretation for mixture of FDD/TDD and/or FR1/FR2** | **Note** | **Mandatory/Optional** |
| 52. NR\_Mob\_Ph4 | 52-1 | Number of CSI-RS resources for L1-RSRP measurement within a slot | * The max number of CSI-RS resources for L1-RSRP measurement that UE can measure within a slot across candidate cells for L1-RSRP measurement | 63-1 | Yes | No | There is no limitation on the number of CSI-RS resources for L1 measurement within a slot. | Per BC | No | No | N/A | Candidate value: {1,2,3,4,5,6,7,8,16,32, 48,64}   * Note: It is also counted in FG 2-24 | Optional with capability signaling |
| 52-2 | Number of total CSI-RS resources to be measured | * The max number of total CSI-RS resources of serving cells and candidate cells across all CCs for L1 measurement. Both LTM candidate cell(s) and serving cells for CSI-RS based L1-RSRP measurement are counted, regardless of whether CSI-RS based L1-RSRP measurement on serving cell is configured in LTM-CSI-ResourceConfig-r18 or not. | 63-1 | Yes | No | There is no limitation on the total number of CSI-RS resources of serving cells and neighbouring cells across all CCs for L1 measurement. | Per BC | No | No | N/A | Candidate values:  {2,4,8,12,16,32,64}   * Note: the value should be not smaller than UE capability of beamManagementSSB-CSI-RS (Component 2 of 2-24) | Optional with capability signaling |
| 52-3 | Skip SSB based L1-RSRP measurement for candidate cell CSI-RS-based L1-RSRP measurement | * Indicates support for skipping SSB-based L1-RSRP during neighboring cell CSI-RS-based L1-RSRP measurement. * Indicates support for skipping SSB-based L1-RSRP during both neighboring cell and serving cell CSI-RS-based L1-RSRP measurement. | 63-1 | Yes | N/A | * CSI-RS resources shall be Type-D QCL’ed with the associated SSB for L1 measurement * CSI-RS resources do not need to be Type-D QCL’ed with the associated SSB for L1 measurement , but shall be Type-D QCL’ed with the associated SSB for L3 measurement | Per UE | no | FR2-1 only | N/A |  | Optional with capability signalling |

# Topic #2: event triggered L1 measurement reporting

#### Issue 2-2: whether to introduce/update requirements for reporting criteria per measurement category

**Candidate options:**

* Option 1: define new requirements of Capabilities for Support of Event Triggering and Reporting Criteria UE capability for LTM (CATT, Nokia, CTC, OPPO, Xiaomi, MTK, CMCC, vivo, ZTE, E///)
  + Option 1a: Introduce reported UE capabilities for supported number of events triggered L1 measurement reporting. The candidate values are {4, 8, 12, 16}. (MTK)
  + Option 1b: vivo
    - RAN4 to specify the reporting capabilities for SSB-based L1 measurements for LTM by considering intra-frequency measurement and inter-frequency measurement. For CSI-RS based L1 measurements for LTM, consider 1 layer of measurement for the reporting capability
    - Reporting criteria for LTM event triggered reporting is 4 per frequency layer.
    - The total number of reporting criteria for LTM event triggered reporting is 4\*n, where n is the total number frequency layers for L1-RSRP measurement, including intra-frequency layer(s), inter-frequency layer(s) for SSB-based L1-RSRP measurement and 1 frequency layer for CSI-RS based L1-RSRP measurement if configured.
  + Option 1c: E///
    - RAN4 to agree 72 as the L1 measurement reporting criteria for a UE supporting event triggered measurement reporting
* Option 2: extend existing Ecat to support LTM intra- and inter-frequency L1 events for SSB and CSI-RS based reporting on top of the existing L3 events in section 9.1.4. (Nokia, OPPO)

**Recommended WF:**

* Agree on option 1 and further discuss option 1a, 1b and 1c.

**Session Chair:** encourage MTK, vivo and E/// to have offline discussion and come up with a unified proposal based on the direction of option 1.

Discussion:

Vivo: how about 40 in total?

MTK: need to discuss the definition of the reporting criteria. Whether it should be defined per cell, per carrier, or in total.

QC: important thing is how many event reporting can be configured.

Baseline for further discussion:

Reporting criteria for LTM event triggered reporting is [5/9] \* 39-3-3 (Number of total cells UE can measure).

# Topic #3: CSI-RS based L1 measurement

#### Issue 3-2: Measurement restriction

* Proposals
  + Proposal 1: In FR2, or in FR1 when CSI-RS based L1 measurement would cause scheduling restriction, all CSI-RS resources within a 40 ms window on one intra-frequency layer should be configured within up to two separate windows, each lasting up to 5 ms. (ZTE, Apple, Ericsson, Xiaomi, CATT)
  + Proposal 2: There are at most two separate windows within every P where P is min{CSI-RS periodicity of cells on one intra-frequency layer} when the periodicity of the configured CSI-RS resources is larger than 20 ms. (Huawei)
    - the starting point of the first window is [( the slot boundary of serving cell) mod P], where the corresponding slot contains the configured L1 CSI-RS resource of the serving cell.
    - The starting point of the second window if configured is determined by an offset of half of P in slots with regards to the starting point of the first window.
  + Proposal 3: When CSI-RS based L1 measurements cause scheduling restriction, all CSI-RS resources on one intra-frequency layer are configured within up to two separate windows where each window is up to 5 ms and the two windows, if configured, are separated by 20ms. (vivo, Apple)
  + Proposal 4: Nokia
    - [CSI-RS measurement window is 5ms](#_Toc206165472)
    - [Discuss further whether the number of windows for CSI-RS LTM candidate cell measurements can be increased](#_Toc206165473)
    - [For UE CSI-RS measurement applicability: Periodicity of CSI-RS resource is between 10ms and 640ms](#_Toc206165474)
    - [The starting point of the first window is the slot boundary of the serving cell, where the corresponding slot contains the configured CSI-RS resource.](#_Toc206165475)
    - [Location of the next window is the slot boundary of the next LTM candidate cell CSI-RS in time domain (defined by CSI-RS configuration)](#_Toc206165476)
* Recommended WF
  + Discuss if proposal 1 can be agreed.

Online Agreement:

Further discuss and down-select one proposal from P1 and P2.

* + Proposal 1: In FR2, or in FR1 when CSI-RS based L1 measurement would cause scheduling restriction, all CSI-RS resources within a 40 ms window on one intra-frequency layer should be configured within up to two separate windows, each lasting up to 5 ms. (ZTE, Apple, Ericsson, Xiaomi, CATT)
  + Proposal 2: There are at most two separate windows within every P where P is min{CSI-RS periodicity of cells on one intra-frequency layer} when the periodicity of the configured CSI-RS resources is larger than 20 ms. (HW, vivo)
    - the starting point of the first window is [( the slot boundary of serving cell) mod P], where the corresponding slot contains the configured L1 CSI-RS resource of the serving cell.
    - The starting point of the second window if configured is determined by an offset of half of P in slots with regards to the starting point of the first window.