**3GPP TSG RAN WG2#127 R2-240xxxx**

**Maastricht, Netherlands, Aug 19th – 23rd, 2024**

**Title: [Draft] LS on beam management UE-sided model LCM**

**Release: Rel-19**

**Work Item: NR\_AIML\_air-Core**

**Source: Intel Corporation (to be TSG RAN WG2)**

**To:** **TSG RAN WG1**

**Contact person: Ziyi Li, ziyi.li@intel.com**

1 Overall description

To support beam management UE-side model life cycle management, RAN2 has studied and worked on the signalling procedure of applicable functionality reporting.

RAN2 has made following agreements and signalling procedure (see the attached figure) on LCM for beam management UE-sided model:



* **Step 1**: Network sends *UECapabilityEnqiry* message to initiate the procedure to a UE reporting its AI/ML supported functionalities.
* **Step 2**: UE sends *UECapablityInformation* message to network, containing supported functionalities at the UE side.
* “**Step 3**”: Following configurations are provided from NW to UE:

1) UE is allowed to do UAI reporting via OtherConfig.

2) Network may provide NW-side additional condition. FFS on the RRC signalling and whether it is mandatory or optional.

3) FFS on configuration (e.g. inference configuration) of supported functionalities. FFS on the content of configuration.

* (**between “Step 3” and “Step 4”**) UE decides the applicable functionalities based on NW-side additional conditions (if provided), UE-side additional conditions (internally known by UE) and model availability in device. FFS whether other configuration can considered by UE (e.g. inference configuration). FFS how the applicable functionality is decided if NW-side additional condition is not provided in step 3.
* “**Step 4**”: UE reports applicable functionality in the following scenarios:

1) Upon being configured to provide applicable functionality and upon change of applicable functionality via UAI

2) As response to NW-side additional condition requesting applicable functionality reporting in step 3, FFS other network configuration (e.g. inference configuration).

* **Step 5**:

1) Network configures inference configuration to UE after applicable functionality reporting, if inference configuration based on supported functionality is not provided in Step 3 (i.e. inference configuration is provided in Step 5).

2) If inference configuration based on supported functionality is provided in Step 3, it is up to network implementation whether to provide an updated configuration or not.

RAN2 also agreed the applicable functionality may be activated by receiving its inference configuration when it is provided in Step 5. FFS the initial activation state. FFS on initial state of applicable functionality if inference configuration of supported functionality is provided in Step 3. FFS on additional L1/L2 signaling for activation/deactivation. FFS if multiple applicable functionalities can be activated at the same time. FFS what is the granularity of functionality.

The above agreements were made based on the following assumptions:

NW-side additional condition is assumed as associated ID in RAN2 (which is used by majority of companies). Other inference configuration (e.g. CSI-RS resource configuration, etc) is considered separately from NW-side additional condition, i.e. it is not considered as part of NW-side additional condition in below proposals. It is up to RAN1 about the details of NW-side additional condition and other inference configuration, and the relationship between them.

Furthermore, RAN2 also agreed the following understandings on terminologies:

|  |
| --- |
| **Supported functionalities** refer to functionalities that UE can indicate by using UE capability information (via RRC/LPP signalling)  **Applicable functionalities** refers to functionalities that the UE is ready to apply for inference  **Activated functionalities** refers to functionalities already enabled for performing inference |

To further progress life cycle management for beam management UE-sided model, RAN2 has following questions would like to check RAN1’s understanding:

On General

* Q1: What is the granularity of supported functionality expressed in the UE capability? For example, whether it is a use case (e.g. beam management), whether it is a sub-use case (e.g. beam management Case 1), or others?
* Q2: If multiple functionalities are defined per use case or sub-use case, whether multiple functionalities can be applicable concurrently for a sub-use case, across sub-use case of a use case, and across different use cases? Whether multiple applicable functionalities can be activated at the same time?

On NW-side additional condition and configuration

* Q3: What is the format of NW-side additional condition?
* Q4: ~~For UE evaluating applicable functionality reporting~~, what is the relationship between NW-side additional condition and inference configuration in Step 3? NW-side additional condition is part of inference configuration, or NW-side additional condition is separate from inference configuration, etc?
* Q5: What is needed by UE to decide applicable functionality before Step 4 (e.g. NW-side additional condition and/or inference configuration from network)?
  + Q5-1: Is it feasible for UE to decide the applicable functionalities without NW-side additional condition? If yes, what information does UE use to decide applicable functionality?
  + Q5-2: Is it feasible for gNB to provide inference configuration UE in Step 3 to applicable functionalities?
  + Q5-3: If inference configuration is needed in Step 3, what is the content of inference configuration based on supported functionality?
  + Q5-4: If inference configuration is not needed in Step 3, what is the content of inference configuration in Step 5?
    - Q5-5: What is the delta between configuration in Step 3 (if provided) and Step 5?
* Q6: Whether NW-side additional condition is functionality specific?

On Functionality Activation

* Q7: What is the initial activation state of UE-sided model before Step 3?
* Q8: Is L1/L2 signalling for functionality activation/deactivation needed?

2 Actions

**To RAN1**

**ACTION:** RAN2 kindly requests RAN1 to take the above RAN2 agreements into consideration, and kindly reply with RAN1 understanding to enable RAN2 further progress in beam management UE-sided model LCM.

3 Dates of next TSG RAN WG2 meetings

TSG-RAN WG2 Meeting #127bis Oct 14th – Oct 18th, 2024 Hefei, CN

TSG-RAN WG2 Meeting #128 Nov 19th – Nov 22nd, 2024 Orlando, US

4 Comment (to be deleted after RAN2 discussion)

|  |  |
| --- | --- |
| **Company** | **Comment (suggestions and other questions)** |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |