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

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

**Title: [Draft] LS on applicable functionality reporting for beam management UE-sided model**

**Release: Rel-19**

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

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

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

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**Attachments: None**

1 Overall description

For functionality-based LCM for UE-sided model for beam management use case, RAN2 has studied and worked on the signalling procedure of applicable functionality reporting.

RAN2 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** refer to functionalities that the UE is ready to apply for inference**Activated functionalities** refer to functionalities already enabled for performing inference |

RAN2 further has made following agreements and signalling procedure (see the attached figure) on applicable functionality reporting 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 assumed by majority of companies).

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

On General

Q1: In Step 2, what is the granularity of functionality? 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?

On NW-side additional condition and configuration

Q2: What is the content of NW-side additional condition, i.e. is it correct the RAN2 assumption of a NW-side additional condition assumed as associated ID?

Q3: Is NW-side additional condition functionality specific?

Q4: RAN2 wonders what information is needed in Step 3 for UE to decide whether a functionality is applicable before Step 4. More specifically, RAN2 would like to ask the following questions (Q4-1 to Q4-5):

* + Q4-1: In RAN2, it is FFS whether NW-side additional condition is mandatory or optional. In order to discuss further, RAN2 would like to understand whether it is feasible for UE to decide the applicable functionalities without NW-side additional condition? If yes, could RAN1 explain how consistency between training and inference can be achieved without NW-side additional condition in Step 3?
	+ Q4-2: In RAN2, it is FFS whether inference configuration (e.g. inference configuration) other than NW-side additional condition can be included in Step 3. RAN2 would like to understand whether it is feasible for gNB to provide configuration (e.g. inference configuration) other than NW-side additional condition in Step 3 for UE to determine applicable functionalities?
	+ Q4-3: For UE evaluating applicable functionality reporting, if the answer to Q4-2 is Yes, what is the relationship between NW-side additional condition and configuration (e.g. inference configuration)? For example, is NW-side additional condition part of inference configuration, or is inference configuration part of NW-side additional condition, or is NW-side additional condition separate from inference configuration, etc?
	+ Q4-4: If the answer to Q4-2 is Yes, what is the content of configuration (e.g. inference configuration) for UE to determine applicable functionalities?
	+ Q4-5: If the answer to Q4-2 is No, what is the content of inference configuration in Step 5?
* Q5: What is the content of applicability functionality reporting in Step 4?

On Functionality Activation

Q6: If inference configuration is provided in Step 3, does it activate the functionality immediately upon receiving Step 3?

Q7: If inference configuration is not provided in Step 3, does configuration in Step 5 activate the functionality immediately upon receiving Step 5?

Q8: If more than one functionality are configured in Step 3 or Step 5, whether multiple/all applicable functionalities can be activated?

Q9: Is L1/L2 signaling for functionality activation/deactivation needed?

2 Actions

**To RAN1**

**ACTION:** RAN2 kindly requests RAN1 to take the above RAN2 agreements into consideration and inform RAN2 in case issues are identified, and kindly reply with RAN1 understanding to enable RAN2 further progress in functionality-based LCM for UE-sided model for Beam Management use case.

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