**3GPP TSG-RAN WG2 Meeting #117 electronic R2-22xxxxx**

**Online, February 21 – March 3, 2022**

**Agenda item: 8.24.1**

**Source: Nokia**

**Title: [AT117-e][057][NR17] FR2 HST (Nokia)**

**WID/SID: NR\_HST\_FR2\_enh**

**Document for: Discussion and Decision**

# Introduction

* [AT117-e][057][NR17] FR2 HST (Nokia)

 Scope: Treat R2-2202167, R2-2203187, R2-2203188, R2-2202867,. Ph1 Determine agreeable parts and converge on discussion points if any, Ph2 agree CRs (and Reply LS only if needed).

 Intended outcome: Report, Agreed CR 38331, endorsed UE cap CRs (or draft CRs) (38306, 38331) for Merge.

 Deadline: Schedule 1

**Contact List**

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# Discussion

RAN4 sent LS on FR2 HST:

R2-2202167 LS on network signaling for Rel-17 NR FR2 HST RRM (R4-2202765; contact: Nokia) RAN4 LS in Rel-17 To:RAN2

It indicates following:

*In the Rel-17 work item on NR support for high-speed train scenarios in FR2 (NR\_HST\_FR2), RAN4 has agreed to specify 2 sets of enhanced NR RRM requirements for UE moving at speed up to 350 km/h. Network signaling assistance is needed to indicate the UE which one of the 2 sets to apply. The per cell signaling is provided to UE in both idle mode and connected mode.*

*Additionally, in FR2 (NR\_HST\_FR2), RAN4 has agreed to introduce following:*

* *network assistance to inform UE on the FR2 HST deployment type (uni-directional or bi-directional), and*
* *network signaling flag to enable/disable large one shot UE autonomous uplink transmit timing adjustment.*

*Thus, network signalings are needed respectively for indicating to UE of the FR2 HST deployment type and whether one step large UE autonomous UL transmit timing adjustment is enabled or not. The per cell signalings are provided to UE in both idle mode and connected mode.*

*RAN4 has also agreed to introduce a new power class for FR2 HST UE, which is numbered as UE power class 6 and the UE type is high speed train roof-mounted UE.*

*It should be noted that the above network signalings except deployment type are applicable to FR2 power class 6 UE, which is FR2 UE type for high speed train roof-mounted UE, and*

*The R16 FR1 HST signaling design can be considered as a reference framework.*

*RAN4 kindly requests RAN2 to define network signalings to support the above-mentioned functionalities for Rel-17 FR2 HST.*

Then there are 2 38.331 CRs provided to the meeting trying to capture RAN4 agreements:

R2-2203187 HST on FR2 Nokia, Nokia Shanghai Bell CR Rel-17 38.331 16.7.0 2933 - B NR\_HST\_FR2 Late

R2-2202867 On the signaling for RRM enhancements for Rel-17 FR2 HST Huawei, HiSilicon draftCRv Rel-17 38.331 16.7.0 B NR\_HST\_FR2

and a 38.306 CR:

R2-2203188 HST on FR2 Nokia, Nokia Shanghai Bell CR Rel-17 38.306 16.7.0 0692 - B NR\_HST\_FR2 Late

## HighSpeedConfig

*In the Rel-17 work item on NR support for high-speed train scenarios in FR2 (NR\_HST\_FR2), RAN4 has agreed to specify 2 sets of enhanced NR RRM requirements for UE moving at speed up to 350 km/h. Network signaling assistance is needed to indicate the UE which one of the 2 sets to apply. The per cell signaling is provided to UE in both idle mode and connected mode.*

*Additionally, in FR2 (NR\_HST\_FR2), RAN4 has agreed to introduce following:*

* *network assistance to inform UE on the FR2 HST deployment type (uni-directional or bi-directional), and*
* *network signaling flag to enable/disable large one shot UE autonomous uplink transmit timing adjustment.*

*Thus, network signalings are needed respectively for indicating to UE of the FR2 HST deployment type and whether one step large UE autonomous UL transmit timing adjustment is enabled or not. The per cell signalings are provided to UE in both idle mode and connected mode.*

Both [1] and [2] have pretty similar proposal how to capture these three different parameters i.e. in the *HighSpeedConfig* IE. There is small difference in the coding of the fields. To the rapporteur [1] looks more in line with condign style of ASN.1 currently used but both coding will work.

Rapporteur would also think having different name for FR2 *HighSpeedConfig* to separate from FR1 as proposed in [2] would be practical i.e. *HighSpeedConfig-FR2.*

**Q1: Are you fine with [1] style of coding or prefer [2] style of coding for *HighSpeedConfig IE*? Or any combination of two. Also would you be fine to have FR2 high speed parameters as new IE *HighSpeedConfigFR2?* And provide any other comments on ASN.1 on these fields/IEs.**

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| **Company** | **Comments** |
| Huawei, HiSilicon | Proponent of [2].So we prefer to have separate IE for FR2 as proposed by [2]. But are fine to follow the majority. Suggest to add “*highSpeed*” before *deploymentTypeFR2-r17* and *largeOneStepUL-timingFR2-r17* in [1] as we did for Rel-16.For the field description of *highSpeedMeasFlagFR2****,*** according to RAN4 LS, this parameter just to indicate which set of RRM enhancement to apply, there seems no requirement on the support of “*MeasurementEnhancementFR2-r17*”. Actually there is no such UE capability in the RAN4 feature list. So we suggest to delete “and UE supports *MeasurementEnhancementFR2-r17*” from the field description  |
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Whether one needs to capture in RAN2 that deployment type is not meant to be configured to PC6 UE. From rapporteur point of view it would not harm to capture limitation not to allow configuring deployment type for PC6 but it should be noted that this would also depend on capability signaling part of this email discussion.

**Q1: Do you think we need to capture not allowing of configuring deployment type for PC6 UE?**

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| **Company** | **Comments** |
| Huawei, HiSilicon | Yes. In RAN4 LS, it is clearly stated that *It should be noted that the above network signalings except deployment type are applicable to FR2 power class 6 UE, which is FR2 UE type for high speed train roof-mounted UE*So this should be reflected in the field description.  |
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## PC6

[4] also indicated:

*RAN4 has also agreed to introduce a new power class for FR2 HST UE, which is numbered as UE power class 6 and the UE type is high speed train roof-mounted UE.*

*It should be noted that the above network signalings except deployment type are applicable to FR2 power class 6 UE, which is FR2 UE type for high speed train roof-mounted UE, and*

In [1] PC6 was captured *ue-PowerClass-v17xy* i.e. as extension of existing power class signaling. As the power class 6 is only supposed to be in one carrier deployments as RAN4 has agreed in R17 not to introduce inter-RAT and inter-frequency requirements, i.e., it is assumed that only one carrier is deployed i.e. no need to capture power class in band combination signaling.

**Q2: Are you fine with [1] style of coding PC6 capturing? Please note this assumes as per RAN4 discussion that in R17 PC6 will only consider stand alone deployment without inter-RAT/frequency requirements i.e. we do not need power class signaling in band combination signaling in release 17.**

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| **Company** | **Comments** |
| Huawei, HiSilicon | We think it seems too early for us to capture this capability since this is still under RAN4 discussion. It is quite possible RAN4 will send us a feature list including this capability after this meeting and we can add this part after that.  |
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## Capabilities

[1] assumes style of assuming PC6 support implicitly indicates support for FR2 HST as this was source companies understanding of RAN4 discussions i.e. PC6 is enough to identify the support for HST FR2 in HST FR2 deployment, and no capability was agreed in RAN4 separately.

There seems to be bit of conflict in RAN4 status as how one can configure deployment type for UE if it is not meant for PC6 UE but there is no capability to indicate support for that. Companies are invitied to check with their RAN4 colleagues what is the RAN4 intention.

**Q3: Do you agree RAN4 current status on not needing separate capability signaling for FR2 HST but it is implicitly supported by PC6 UE? Any other comments on 38.306/38.331 capability part of CRs?**

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| **Company** | **Comments** |
| Huawei, HiSilicon | Similar comment as Q-2.2. Support to wait for RAN4.  |
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## Other

**Q5: Any other issues needing discussion?**

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| **Company** | **Comments** |
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# Summary

# References

[1] R2-2203187 HST on FR2 Nokia, Nokia Shanghai Bell. Nokia, Nokia Shanghai Bell

[2] R2-2202867 On the signaling for RRM enhancements for Rel-17 FR2 HST. Huawei, HiSilicon

[3] R2-2203188 HST on FR2 Nokia. Nokia Shanghai Bell

[4] R2-2202167 LS on network signaling for Rel-17 NR FR2 HST RRM