**3GPP T****SG-RAN WG3 Meeting #122 R3-237778**

**Chicago, USA, 13th – 17th November 2023**

**Agenda Item: 25.2.1**

**Source: Nokia (moderator)**

**Title: CB: # R18XR1\_PDUSet**

**Document for: Other**

# Introduction

This is the summary document for the following come back:

CB: # R18XR1\_PDUSet

- Discuss the open issues above

- Provide TPs if agreeable

(moderator - Nok)

Please provide your comments by 6AM, Wednesday (Nov 15th) Chicago time, in order to discuss it in Wed morning.

# For the Chairman’s Notes

1. **UP design**
2. **TP**

# Discussion first round

## PDU Set handling Support indicator

RAN3 agreed:

**Turn the following WA into agreement on the capability indication of PDU set handling: Taking Opt1 (Explicit PDU Set handling Support indicator) for XR in R18.**

Moderator propose to check the related NGAP TP, e.g. R3-237438 (Please only focus on the new text/IE on PDU Set QoS Support Indicator)

Contribution (R3-237359) proposes the Support Indicator is also needed in Xn HANDOVER REQUEST ACKNOWLEDGE mssage.

Contribution (R3-237261) proposes the Support Indicator is also needed in F1AP-UE CONTEXT SETUP/MODIFICATION RESPONSE messages, and E1 E1AP-BEARER CONTEXT SETUP/MODIFICATION RESPONSE messages.

Contribution (R3-237331) proposes the Support Indicator is also needed in Xn HANDOVER REQUEST ACKNOWLEDGE mssage, and E1AP.

**Q1: Please share your view on:**

* Any comments on NGAP TP R3-237438 (Please only focus on PDU Set QoS Support Indicator related text).
* Any view to add the PDU Set handling Support indicator in XnAP HANDOVER REQUEST ACKOWLEDGE message, F1AP-UE CONTEXT SETUP/MODIFICATION RESPONSE messages, and E1 E1AP-BEARER CONTEXT SETUP/MODIFICATION RESPONSE messages.

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| **Company** | **Comment** |
| Nokia | Agree to use R3-237438 as a starting point. Agree to add the support indicator in XnAP, F1AP and E1AP. |
| Xiaomi | Agree with Nokia |
| Huawei | Agree the PDU set handling support indicator to be included in the NGAP For the NGAP TP R3-237438, the procedure text seems not needed, same as the MBS support indicator.Agree to also introduce the support indicator in XnAP HANDOVER REQUEST ACKOWLEDGE message. And suggest the XnAP TP in R3-237359 can be taken as start point if this can be agreed.No need to be included in E1AP and F1AP, because we already agreed that the “**If a gNB supports PDU Set handling, all parts support it: DU, CU-CP, CU-UP.**” |
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**Summary**

## UP design

**Down-select between opt 1 and opt 3**

Option1: define PSI and EoDB into the existing Frames (e.g frame with PDU Type =0) of NG-U/F1-U: 9 companies

Option3: Define a new GTP-U extension PDU Set container for PSI and EoDB: 3 companies

There is a question on how an XR-incapable target NG-RAN node ignore the new XR field during the data forwarding of Xn-HO.

**Q2: Please share your view on adopt Option 1 or Option 3, and how to address the above issue:**

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| **Company** | **Comment** |
| Nokia | As we commented online, we prefer Option 1, but can also accept Option 3 if majority want. For the issue, it can be avoided. Source NG-RAN node can know whether target NG-RAN node support it during the Xn HO preparation procedure. Then source NG-RAN node does not include the new XR field during the data forwarding.  |
| Xiaomi  | We’re neutral but slightly prefer option 3, which is cleaner and have less processing consumption from decoding point of view, if the receiving node cannot read the PDU set specific header, it just ignores the whole frame, if option 1 is used, the receiving node needs to decode the whole frame and it will find out some information cannot be read and ignore it.  |
| Huawei | Prefer option 1. For the issue, both Nokia, and Xiaomi’s solution can solve the issue. i.e., the source NG-RAN can remove the PDU set related fields before the data forwarding, or the receiver can ignore the unknown fields (With “Extension Header Length” field, the legacy receiver is aware of the length of the GTP-U extension header, and can identify the position of these new added fields.) Can accept option 3 if majority in favor of it. |
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**Summary**

## N6 Jitter

There is UL Jitter reported from the UE, and the DL Jitter received from 5GC. For UL jitter, UE report it via *UEAssistanceInformation-v1800*. Current *CU to DU RRC Information* IE includes the *UEAssistanceInformation* IE. The UL Jitter can be different to DL Jitter.

The DL Jitter is received from 5GC, as defined in 23.501:

At reception of measured N6 Traffic Parameter(s) from the UPF in the N4 Session Level Report, the SMF includes the N6 jitter range together with the associated DL periodicity and the UL periodicity if not provided by the AF in the TSCAI and forwards it to the NG-RAN in an NGAP message, see clause 5.27.2.

NOTE 2: In order to prevent frequent updates from the UPF, the UPF sends the N6 Jitter Measurement Report periodically or only when the N6 jitter is larger than a threshold.

The DL periodicity associated N6 jitter indicates the positive or negative deviation of the arrival time of first packet of a Data Burst compared to the ideal Data Burst start time which is be determined based on the DL periodicity.

Contribution (R3-237392) proposes to transfer the UL Traffic Information to UP via E1AP.

**Q3: Please share your view on:**

* Whether need any enhancement to support UL Jitter in F1AP, and E1AP
* How to define the N6 Jitter, following options:
* **Opt1: Align with the R2 defined UL jitter range and granularity: Define upper bound and lower bound for N6 jitter separately, with the range of [-7, +7] ms and the granularity of 0.5 ms.**
* **Opt2: Define N6 jitter with reference to TS29.244**
* **Opt3: ENUMERATED (ms1, ms2, ms3,...)**

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| **Company** | **Comment** |
| Nokia | For UL Jitter, No new IE is needed in F1AP, since current *CU to DU RRC Information* IE also contains the *UEAssistanceInformation* IE. For DL Jitter, prefer Opt 2 for following reasons: 1) DL Jitter can be different to UL Jitter, 2) 23.501 states it should be a singed value in order to provide a “positive or negative deviation”  |
| Xiaomi | For F1AP, UL traffic information (not only jitterRange, but also trafficPeriodicity, burstArrivalTime, pduSetIdentification) can needs to be transferred over F1AP, existing *UEAssistanceInformation* IE can be reused but the procedural text should be updated, the DU behavior is different in XR case, as we captured in R3-237392. For E1AP, we think at least trafficPeriodicity, jitterRange and burstArrivalTime can be provided to CU-UP for resource management, as the same information for DL is already introduced. For the N6 jitter encoding, we don’t think it’s a good idea to copy paste UL jitter, DL jitter is measured by CN function, and DL jitter have different characteristics from UL jitter, option 2 is the only correct option to choose. |
| Huawei | For UL Jitter, F1AP already support the UAI delivery from CU to DU, agree with Nokia. For E1AP, we do not see any motivation for the CU-UP to know the UAI.For the N6 jitter, we propose some rewording for option 1, and prefer this option 1 for the following reasons:* Option 1 allows that the DL jitter be different with the UL jitter. The design in option 1 just try to use same range and granularity as UL jitter, the value of upper bound and lower bound of DL jitter can definitely be different from the UL jitter.
* Option 1 allows the indicates the positive or negative deviation as defined in TS 23.501, and provides more flexibility when compared to option 3.
* For option 2, The *N6 Jitter measurement* defined in 29.244 is used for the UPF to report the measured N6 jitter, and it contains a lot of contents, e.g., the “DL periodicity” can be included in this IE. However, we know that DL Periodicity already included in existing TSCAI as mandatory IE, if reuse the *N6 Jitter measurement* defined in 29.244, there will be redundant information about the periodicity and the overhead is really large.

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|  |  | **Bits** |  |
|  | **Octets** | **8** | **7** | **6** | **5** | **4** | **3** | **2** | **1** |  |
|  | 1 to 2 | Type = 327 (decimal) |  |
|  | 3 to 4 | Length = n |  |
|  | 5 | Spare | DL |  |
|  | 6 to 9 | DL Periodicity |  |
|  | 10 to 13 | Lower DL Jitter Measurement |  |
|  | 14 to 17 | Higher DL Jitter Measurement |  |
|  | 18 to (n+4) | These octet(s) is/are present only if explicitly specified |  |

**Figure 8.2.220-1: N6 Jitter Measurement*** Option 3 requires the positive deviation and negative deviation share same value.
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**Summary**

## Non-homegeneous deployment

Moderator believes Contribution (R3-237391) proposes a good summary for Stage-2 TP. Moderator propose to use this contribution as a starting point, and check whether there is anything missing.

**Q4: Please share your view on Stage-2 TP (R3-237391), e.g. anything missing, or any error, etc:**

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| **Company** | **Comment** |
| Nokia | Agree with **Stage-2 TP (R3-237391)** |
| Xiaomi | Agree with **Stage-2 TP (R3-237391) as starting point** |
| Huawei | Even for the HO from non-PDU set handling capable NG-RAN node, instead of allow the target NG-RAN node provides the support indicator to the SMF directly, we think the following principle should be applied also: The NG-RAN provides explicit indication of PDU set handling support after receiving the PDU set QoS parameters from SMF.In addition, maybe the stage 2 TP can also include the non-HO case. |
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**Summary**

## Separate UL/DL PDU Set QoS parameters

Contribution (R3-237332, R3-237390, R3-237540) proposes to add a direction field to indicate whether the PDU Set QoS parameter is for UL, or DL, or both UL and DL.

9.3.1.x PDU Set QoS Parameters

This IE defines the PDU Set QoS Parameters to be applied to a QoS flow.

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| **IE/Group Name** | **Presence** | **Range** | **IE type and reference** | **Semantics description** |
| PDU Set Packet Delay Budget | O |  | Extended Packet Delay Budget 9.3.1.135 | PDU Set Delay Budget as specified in TS 23.501 [9]. |
| PDU Set Error Rate | O |  | Packet Error Rate9.3.1.81 | PDU Set Error Rate as specified in TS 23.501 [9]. |
| PDU Set Integrated Handling Information | O |  | ENUMERATED (true, false, …) | PDU Set Integrated Handling Information as specified in TS 23.501 [9]. |
| Direction information | O |  | ENUMERATED (uplink, downlink, both-uplink-and-downlink, …) | Direction Information for the PDU Set QoS Parameters. |

Moderator consider adding the *Direction information* can make this IE more future-proof.

**Q5: Please share your view on adding *Direction Information* IE in NGAP/XnAP/F1AP/E1AP *PDU Set QoS Parameters* IE.**

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| **Company** | **Comment** |
| Nokia | Agree to add *Direction Information* IE in NGAP/XnAP/F1AP/E1AP *PDU Set QoS Parameters* IE.Sorry to the co-signers, I forgot to submit the E1AP TP. I uploaded the E1AP TP in the draft folder. |
| Xiaomi | Agree to add *Direction Information* IE in NGAP/XnAP/F1AP/E1AP *PDU Set QoS Parameters* IE.At least we think the UL PSDB and UL PSIHI are needed. UL PSDB can be used for PDCP discard timer configuration, and UL PSIHI can be used for gNB to decide whether to activate or deactivate the discard operation in UE side. |
| Huawei | Not need now, we need to wait for SA2 feedback. |
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**Summary**

## QoS Flow established with PDU Set QoS or normal QoS parameters

Contribution (R3-237359, R3-237624, R3-237678, R3-237392) proposes: the NG-RAN node needs to provide an indication of whether the PDU Set QoS is accepted. The reason is the QoS flow may be established with PDU Set QoS parameters, or with normal QoS parameters (e.g. when an XR-capable NG-RAN node does not have enough resource to support the PDU Set QoS parameters)

**Q6: Please share your view whether an XR-capable NG-RAN node need to inform SMF whether a QoS Flow is established with PDU Set QoS parameters or with normal QoS parameters.**

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| **Company** | **Comment** |
| Nokia | It is beneficial for SMF to know whether a QoS Flow is established with PDU Set QoS parameters, or with normal QoS parameters.  |
| Xiaomi | It is possible that NG-RAN node establishes the QoS flow with normal QoS instead of PDU set QoS, even though it supports PDU set QoS handling. This case provides more flexibility for NG-RAN node operation and can be decided by RAN3, if we agree to support this scenario, SMF should be informed about whether the QoS flow is setup with PDU set QoS or legacy QoS, so that it can notify UPF start or stop PDU set marking which is already supported in SA2. |
| Huawei | We think such indication is needed. And can be achieved by adding a new IE to indicate the QoS flow(s) setup successfully but without accepting the PDU set QoS parameters. |
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**Summary**

## End of Data Burst

Contribution (R3-237359) provides following analysis:

First, in TS 26.522, End of Data Burst (EDB) field is defined as 3 bits length to provide guidelines to UPF for identifying the end of a Data Burst, as described below.

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| - **End of Data Burst [EDB] (3 bits):** The EDB field is 3 bits in length and indicates the end of a Data Burst. The 3 bits encode the End of Data Burst indication as per the encoding and guidelines provided in Clause 4.4.2.6.1. |

However, the field provided by UPF to NG-RAN could be much simpler since the end of the Data Burst is already identified by the UPF, and one bit would be enough to indicate the end to NG-RAN. So to make things simpler and to save the extension header overhead, we suggest RAN3 to define EDB as 1 bit length in the GTP-U headers.

***Proposal 10*: RAN3 to use 1 bit to indicate the End of Data Burst in TS 38.415 and TS 38.425.**

Moderator believes that it may be better to align with 26.522. Otherwise, it can cause issue in case the full 3-bit is used in future release.

**Q7: Please share your view on use 3-bit (align with TS26.522), or 1-bit for End of Data Burst.**

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| **Company** | **Comment** |
| Nokia | Prefer 3-bit to align with TS 26.522 |
| Xiaomi | Prefer to align with TS 26.522 |
| Huawei | It is just an end indication, and 1 bit is enough. SA4 also re-evaluate whether the 3 bits length is over design or not. |
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**Summary**

## New DRX Cycle in F1AP

Contribution (R3-237633) provides new DRX cycle based on rational numbers which aligns with RAN2, needs to be contained in F1 interface.

**Q8: Please share your view on introduce new DRX cycle based on rational numbers in F1AP.**

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| **Company** | **Comment** |
| Nokia | Agree. A new F1AP IE may be needed.  |
| Xiaomi | Agree, RAN3 can update the corresponding specs based on the stable outcome of RAN2 running CR, this can be done next meeting. |
| Huawei | Agree, can wait for R2 outcome. |
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**Summary**

## Other issues

Please add other issues if missing. Moderator suggest only list the urgent issues that must be solved in this meeting in order to complete the WI. Other enhancements can be further proposed in Feb meeting. Thank you very much for your understanding!

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| **Company** | **Any issues need to be resolved in this meeting** |
| Huawei | Presence of PDU Set Size, we raise this issue in R3-237359:PDU Set Size is defined to be optional in the RTP extension header according to TS 26.522. However, PDU Set Size is not regarded as optional in SA2 TS 23.501. So when designing the corresponding field in the GTP-U extension header, RAN3 can assume it is always present along with the other PDU set parameters. This can simplify our design for the GTP-U header in UP. In this way, the UPF’s behaviour when it cannot obtain the PDU Set Size information shall be specified, e.g., to mark the field as “0”. RAN3 can send an LS to SA2 to raise the issue and ask SA2 for confirmation. And our proposal is:**RAN3 assumes the PDU set size is always present along with the other PDU set parameters. And send LS to SA2 for confirmation.** |
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**Summary**

# References

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| [R3-237359](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_122%5CDocs%5CR3-237359.zip) | (TP for NR\_XR\_enh BL CRs for TS38.413/38.423/38.473/38.415):PDU set handling for support NR XR (Huawei) |
| [R3-237438](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_122%5CDocs%5CR3-237438.zip) | (TP for TS 38.413 BL CR) Discussion on support for PDU Set based QoS handling (Nokia, Nokia Shanghai Bell) |
| [R3-237261](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_122%5CDocs%5CR3-237261.zip) | XR Enhancements for PDU Set Handling (Qualcomm Incorporated) |
| [R3-237331](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_122%5CDocs%5CR3-237331.zip) | (TP to BL CR for 38.413, 37.483, 38.423) Discussion on the support of PDU Set handling (Samsung) |
| [R3-237332](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_122%5CDocs%5CR3-237332.zip) | (TP to BL CR for TS 37.483) Addition of UL PDU Set QoS parameters (Samsung, Ericsson, Nokia, Nokia Shanghai Bell, Qualcomm Inc., Xiaomi, China Telecom) |
| [R3-237390](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_122%5CDocs%5CR3-237390.zip) | (TP for TS 38.423) Introduction of Direction Information for PDU Set QoS Parameters (Xiaomi, Ericsson, Qualcomm Inc., Nokia, Nokia Shanghai Bell, Samsung, China Telecom) |
| [R3-237391](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_122%5CDocs%5CR3-237391.zip) | (TP for TS 38.300) Non-homogenous support of PDU set based QoS handling in NG-RAN (Xiaomi, Nokia, Nokia Shanghai Bell, ZTE) |
| [R3-237392](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_122%5CDocs%5CR3-237392.zip) | (TPs for 38.473, 37.483 and 38.413) PDU set based QoS handling for XR (Xiaomi) |
| [R3-237421](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_122%5CDocs%5CR3-237421.zip) | (TP to BLCR for TS 38.415) User Plane Protocol for PDU Set Information (Lenovo, Ericsson) |
| [R3-237539](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_122%5CDocs%5CR3-237539.zip) | (TP to F1-AP BL CR): introduction of UL UE XR Traffic assistance Information (Ericsson) |
| [R3-237540](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_122%5CDocs%5CR3-237540.zip) | (TP to NG-AP BL CR): introduction of Direction Information for PDU Set QoS Parameters (Ericsson, Qualcomm Inc., Nokia, Nokia Shanghai Bell, Samsung, Xiaomi, China Telecom) |
| [R3-237541](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_122%5CDocs%5CR3-237541.zip) | LS on defining new GTP-U Extension Header for PDU Set Information (Ericsson, lenovo) |
| [R3-237591](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_122%5CDocs%5CR3-237591.zip) | (TP for XR 38.415 and 38.425) Discussion on PDU set handling for XR (CATT) |
| [R3-237624](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_122%5CDocs%5CR3-237624.zip) | Discussion on support of PDU Set Handling (ZTE) |
| [R3-237625](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_122%5CDocs%5CR3-237625.zip) | (TP to BL CR TS 38.415) Support for XR UP design using existing frame (ZTE, Nokia, Nokia Shanghai Bell, China Telecom, China Unicom, CMCC) |
| [R3-237626](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_122%5CDocs%5CR3-237626.zip) | (TP to BL CR TS 38.415) Support for XR UP design using new container (ZTE, Ericsson, China Unicom, China Telecom) |
| [R3-237627](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_122%5CDocs%5CR3-237627.zip) | (TP to BL CR TS 38.410) Support for XR UP design using new container (ZTE, Ericsson, China Unicom, China Telecom) |
| [R3-237628](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_122%5CDocs%5CR3-237628.zip) | (TP to BL CR TS 38.420) Support for XR UP design using new container (ZTE, Ericsson, China Unicom, China Telecom) |
| [R3-237629](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_122%5CDocs%5CR3-237629.zip) | (TP to BL CR TS 38.470) Support for XR UP design using new container (ZTE, Ericsson, China Unicom, China Telecom) |
| [R3-237633](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_122%5CDocs%5CR3-237633.zip) | Discussion on XR Enhancement in Split Architecture (China Telecom) |
| [R3-237677](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_122%5CDocs%5CR3-237677.zip) | (TP for TS38.425) Support for XR PDU Set Handling (CMCC, Nokia, Nokia Shanghai Bell, Huawei, ZTE) |
| [R3-237678](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_122%5CDocs%5CR3-237678.zip) | Discussion on PDU Set handling (CMCC) |