3GPP TSG-RAN WG3 #114-e R3-215818
Online, 1-11 November 2021

Agenda Item: 8.1

Source: Ericsson (moderator)

Title: CB: # 13\_RACS

Document for: Discussion

# Introduction

**CB: # 13\_RACS**

**- Update NGAP to clarify the AMF behaviour, upon the reception of the optional UE Radio Capability for Paging of NR IE and the UE Radio Capability for Paging of E-UTRA IE? Introduce the UE Radio Capability for Paging encoded in TS 38.331 format in the S1AP UE CAPABILITY INFO INDICATION message? Nok**

**- For TS 36.413, add the NR format of the UE Radio Capability for Paging in the UE CAPABILITY INFO INDICATION message? Add the UE radio capability ID in S1: Paging, NG: Paging, and Xn RAN Paging messages? Include the UE radio capability for paging in the NG: UE RADIO CAPABILITY ID MAPPING RESPONSE message? HW**

**- Add a new UE Radio Capability for Paging for NR IE in the UE CAPABILITY INFO INDICATION message? E///**

**- Reply LS to SA2 if needed**

# To the chair’s notes (Draft)

**R3-21xxxx, R3-21xxxx agreed**

**No consensus on strange topic**

Etc.

# Introduction

RAN3 received a LS from SA2 [1] in which a set of agreed CRs is attached that introduce the storage of the UE Radio Capability For Paging (URCFP) in the UCMF, so that the UE Radio Capability ID a UE provides is sufficient for the MME and AMF to also obtain these from the UCMF, without requiring the upload of the Radio capabilities and related URCFP from the RAN.

SA2 then asks RAN3, CT4, CT to

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| **To RAN3, CT4, CT:****ACTION:** Please take these CRs into account for any impact they might have on the specifications under your responsibility and provide any feedback if necessary. |

# Discussion

## Addition of URCFP – NR format- to S1-AP

A common point that emerges from all companies’ proposals is the addition of a new URCFP IE encoded in TS 38.331 format (***UE Radio Capability for Paging – NR Format*** IE) in the S1AP UE CAPABILITY INFO INDICATION message.

Taking as examples the proposal from [4] and merging the procedural text from [4], [7] and [13], it is proposed to discuss the addition of the IE to S1-AP and whether there are any details regarding the procedural text and the encoding of the IE (presence, tabular description, asn.1, etc.) that need to be discussed.

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| 8.9.2 Successful Operation**Figure 8.9.2-1: UE Capability Info Indication procedure. Successful operation.**The eNB controlling a UE-associated logical S1-connection initiates the procedure by sending a UE CAPABILITY INFO INDICATION message to the MME including the UE capability information. The UE CAPABILITY INFO INDICATION message may also include paging specific UE capability information within the *UE Radio Capability for Paging* IE and within the *UE Radio Capability for Paging – NR Format* IE. The UE capability information received by the MME shall replace previously stored corresponding UE capability information in the MME for the UE, as described in TS 23.401 [11]. If UE CAPABILITY INFO INDICATION message contains the *LTE-M indication* IE, the MME shall, if supported, store this information in the UE context and use it according to TS 23.401 [11].If the UE indicates the support for UE Application Layer Measurement, the eNB shall if supported include the UE Application Layer Measurement Capability IE in the UE CAPABILITY INFO INDICATION message. The MME shall, if supported, store and use thie information when initiating UE Application Layer Measurement.If UE CAPABILITY INFO INDICATION message contains the *UE Radio Capability – NR Format* IE, the MME shall, if supported, use it according to TS 23.401 [11].If the UE RADIO CAPABILITY INFO INDICATION message contains the *UE Radio Capability for Paging* IE and the *UE Radio Capability for Paging – NR Format* IE, the MME shall, if supported, use it according to TS 23.401 [11]. |

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| 9.2.1.x UE Radio Capability for Paging – NR FormatThis IE contains paging specific UE Radio Capability information encoded as specified in TS 38.331 [50] in order to support Mode of operation A as specified in TS 23.401 [11].

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| IE/Group Name | Presence | Range | IE Type and Reference | Semantics Description |
| UE Radio Capability for Paging – NR Format | M |  | OCTET STRING | Includes the RRC *UERadioPagingInformation* message as defined in TS 38.331 [50]. |

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* **Do companies have any consideration on the above changes to S1-AP: procedural ext and encoding of the new IE?**

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| **Company** | **Comment** |
| Ericsson | First of all, we realize that the new IE should have a “Conditional” presence in the UE CAPABILITY INFO INDICATION message, because the IE must come together with the E-UTRA URCfP IE. Otherwise, it would be possible for an eNB to signal the URCFP for NR but not the URCFP for E-UTRA. This creates issue as NR connected to EPC is not a supported deployment in 3GPP. (Note that there is no issue with URC, as the E-UTRA IE has a M presence, while the NR URCP is Optional)Otherwise, we think that just the first text change is sufficient, and there is no need for the second added sentence at the end, since we already have the TS 23.401 reference in the legacy text and the IE tabular description further clarifies the use of the IE (to support Mode A operation). |
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## AMF behaviour

It is proposed in [3] to update NGAP to clarify the AMF behaviour, upon the reception of the optional URCFP for NR IE **and** the URCFP for E-UTRA IE in the UE CAPABILITY INFO INDICATION message as below:

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| 8.14.1.2 Successful Operation**Figure 8.14.1.2-1: UE radio capability info indication**The NG-RAN node controlling a UE-associated logical NG connection initiates the procedure by sending a UE RADIO CAPABILITY INFO INDICATION message to the AMF including the UE radio capability information.The UE RADIO CAPABILITY INFO INDICATION message may also include paging specific UE radio capability information within the *UE Radio Capability for Paging* IE.The UE radio capability information received by the AMF shall replace previously stored corresponding UE radio capability information in the AMF for the UE, as described in TS 23.501 [9].If the UE RADIO CAPABILITY INFO INDICATION message includes the *UE Radio Capability – E-UTRA Format* IE, the AMF shall, if supported, use it as specified in TS 23.501 [9].If the *UE Radio Capability for Paging* IE included in the UE RADIO CAPABILITY INFO INDICATION message includes the *UE Radio Capability for Paging of NR* IE and the *UE Radio Capability for Paging of E-UTRA* IE, the AMF shall, if supported, use it as specified in TS 23.501 [9]. |

* **Do companies have any view on this procedural text addition?**

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| **Company** | **Comment** |
| Ericsson | A proposed rewording is to replace the second “includes” by “contains” to avoid repetition |
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## Addition of the UE radio capability ID in S1/NG/Xn Paging messages

In [6], it is proposed to add the UE radio capability ID in S1: Paging, NG: Paging, and Xn RAN Paging messages. This is based on the fact that when the AMF/MME has the UE radio capability ID, it can include the UE radio capability ID in the paging messages. The RAN node can either derive the URCFP directly from UE radio capability based on the UE radio capability ID if local cache is available, or lookup the URCFP directly if the local cache is available.

* **Do companies agree and have any view on the above proposal and the corresponding CRs in [7][8][9]?**

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| **Company** | **Yes/No** | **Comment** |
| Ericsson | No | We have concern that this proposal represents a costly and unnecessary optimization. If AMF only includes the UE Radio Cap ID in paging message, the NG-RAN will use it to determine the URCfP, when it is locally cached. However, if not cached in NG-RAN (an NG-RAN is not mandated to store the URCFP), then the paging procedure will get executed in a sub-optimal manner without the URCfP. Moreover, even if cached, the search the NG-RAN database may become costly depending on how big the cache is at the end…Hence, there is no real choice for the AMF but to include in the paging message the URCFP, which is technically possible from the set of agreed SA2 CRs; and providing both UE radio cap ID and URCFP provides no benefits. As the proponents even say in [6]: “Then it is easy for the AMF to include the URCFP in the NG/S1 paging messages”  |
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## Addition of the URCFP in the NG-AP: UE RADIO CAPABILITY ID MAPPING RESPONSE message and reply LS

It is proposed in [6] to discuss the addition of the UE radio capability for paging in the NG message from AMF to RAN UE RADIO CAPABILITY ID MAPPING RESPONSE message.

* **Do companies agree and have any view on the above proposal?**

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| **Company** | **Yes/No** | **Comment** |
| Ericsson | No | Currently, we do not see the need to provide thia. To our knowledge this is not part of 502 or 501 CRs. What would be the use cases? |
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## Reply LS to SA2

* **Any need for a reply LS to SA2?**

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| **Company** | **Yes/No** | **Comment** |
| Ericsson | No | No, since we don’t have any necessary feedback |
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# Conclusion (draft)

# References

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| **RACS** |
| **[1]** | [R3-214709](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_114-e%5CDocs%5CR3-214709.zip) | LS on the UE Radio Capability for Paging in RACS context (SA2) | LS in |
| **[2]** | [R3-215334](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_114-e%5CDocs%5CR3-215334.zip) | Discussion on support the UE Radio Capability for Paging in RACS context (Nokia, Nokia Shanghai Bell, Vodafone) | discussion |
| **[3]** | [R3-215335](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_114-e%5CDocs%5CR3-215335.zip) | (NGAP CR) support the UE Radio Capability for Paging in RACS context (Nokia, Nokia Shanghai Bell, Vodafone) | CR0688r, TS 38.413 v16.7.0, Rel-16, Cat. F |
| **[4]** | [R3-215336](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_114-e%5CDocs%5CR3-215336.zip) | (S1AP CR) support the UE Radio Capability for Paging in RACS context (Nokia, Nokia Shanghai Bell, Vodafone) | CR1840r, TS 36.413 v16.7.0, Rel-16, Cat. F |
| **[5]** | [R3-215337](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_114-e%5CDocs%5CR3-215337.zip) | [Draft] Reply LS on the UE Radio Capability for Paging in RACS context (Nokia) | LS out To: SA2 CC: CT4, CT |
| **[6]** | [R3-215395](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_114-e%5CDocs%5CR3-215395.zip) | UE Radio Capability for Paging in RACS context (Huawei, Deutsche Telekom) | discussion |
| **[7]** | [R3-215396](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_114-e%5CDocs%5CR3-215396.zip) | UE Radio Capability for Paging in RACS context - Local transcoding (Huawei, Deutsche Telekom) | CR1842r, TS 36.413 v16.7.0, Rel-16, Cat. F |
| **[8]** | [R3-215397](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_114-e%5CDocs%5CR3-215397.zip) | UE Radio Capability for Paging in RACS context (Huawei, Deutsche Telekom) | CR0694r, TS 38.413 v16.7.0, Rel-16, Cat. F |
| **[9]** | [R3-215398](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_114-e%5CDocs%5CR3-215398.zip) | UE Radio Capability for Paging in RACS context (Huawei, Deutsche Telekom) | CR0698r, TS 38.423 v16.7.0, Rel-16, Cat. F |
| **[10]** | [R3-215399](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_114-e%5CDocs%5CR3-215399.zip) | [Draft] Reply LS on the UE Radio Capability for Paging in RACS context (Huawei) | LS out To: SA2 CC:  |
| **[11]** | [R3-215642](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_114-e%5CDocs%5CR3-215642.zip) | UE Radio Capability for Paging in RACS context (Huawei, Deutsche Telekom) | CR1849r, TS 36.413 v16.7.0, Rel-16, Cat. F |
| **[12]** | [R3-215417](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_114-e%5CDocs%5CR3-215417.zip) | Discussion on the SA2 LS on the UE Radio Capability for Paging in RACS context (Ericsson) | discussion |
| **[13]** | [R3-215418](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_114-e%5CDocs%5CR3-215418.zip) | Addition of UE Radio Capability for Paging for NR to S1-AP (Ericsson) | CR1845r, TS 36.413 v16.7.0, Rel-16, Cat. F |