3GPP TSG-RAN WG3 Meeting #127 R3-250794

Athens, Greece, 17-21 Feb, 2025

Agenda Item: 16.2

Source: Huawei - Moderator

Title: Summary of Offline Discussion – CB: # AIoT1\_General

Document for: Approval

# Introduction

This is the summary document for the following come back:

**CB: # AIoT1\_General**

**- Check the open issues above**

**- Work on stage2 and stage3 BL CRs based on agreements**

(moderator - HW)

Summary of offline disc [R3-250794](file:///D:\RAN3\RAN3%23127\Inbox\Drafts\CB%20%23%20AIoT1_General\Inbox\R3-250794.zip)

1. For the Chairman’s Notes

**Architecture aspects:**

* **AIoT RAN node is an aggregated gNB. And this gNB may or may not only provide the AIOT radio.**
* **AIOTF may be aware of the location of reader via OAM configuration.**
* **FFS: The details of the location of reader (e.g., room number, GNSS info) are FFS, and it is FFS on signaling support.**
* **FFS: To support selection of RAN node by AIOTF, define a new AIoT Area, or use Tracking Area dedicated for A-IoT?**
* **Upon receiving only the area in Inventory Request, the gNB selects readers within the indicated area.**
* **Upon receiving neither the area nor the reader list in Inventory Request, the gNB selects all the served readers.**
* **WA: Upon receiving only the reader list in Inventory Request, the gNB selects readers as indicated by the reader list.**
* FFS: Upon receiving both the area and the reader list in Inventory Request, the gNB selects the readers within the indicated area and the readers within the reader list.

**About Inventory Procedures:**

* **Introduce a NGAP Class 1 Inventory Request procedure.**
* **Introduce INVENTORY REQUEST message, which includes Inventory Request Transfer IE.**
* **Introduce INVENTORY RESPONSE message, which includes Inventory Response Transfer IE.**
* **Introduce INVENTORY FAILURE messages, which includes Inventory Failure Transfer IE.**
* **Introduce a NGAP Class 2 Inventory Report procedure.**
* **Introduce INVENTORY REPORT message, which includes Inventory Report Transfer IE.**
* **The above Transfer IEs are transparent to AMF in case of indirect communication.**
* FFS: For Inventory related messages, the inclusion of Correlation Identifier and AIOTF Identifier.

**About Command Procedure:**

* **Introduce a NGAP Class 1 Command Request procedure.**
* **Introduce COMMAND REQUEST message, which includes Command Request Transfer IE.**
* **Introduce COMMAND RESPONSE message, which includes Command Response Transfer IE.**
* **Introduce COMMAND FAILURE messages, which includes Command Failure Transfer IE.**
* **The above Transfer IEs are transparent to AMF in case of indirect communication.**
* FFS: For Command related messages, the inclusion of Correlation Identifier and AIOTF Identifier.
* FFS: For command related messages, whether the Correlation Identifier IE if included is the same one as in the related Inventory procedure?
* FFS: Command request procedure is a per device procedure or to be used for multiple devices?
* FFS: The need for a Command Report procedure?
* FFS: Device association between gNB and AIOTF is used in Command procedure.

**About Interface management procedures:**

* FFS: In indirect path communication, existing NG interface management procedures are used between the gNB and the AMF.
* FFS: In direct path communication, existing NG Setup, RAN Configuration Update, NG Reset, Error Indication procedures are used between the gNB and the AIOTF.
* FFS: For interface management procedures, if reuse existing ones, how to handle the not applicable mandatory IEs, and how to handle A-IoT only support case.

**Agree the following LS and TPs:**

* **R3-250814 [Draft] LS to SA2/SA5 and Cc RAN2 on RAN3 progress. With WID code. (Huawei [to be RAN3])**
* **R3-250815 (TP to TS 38.300 BL CR) A-IoT Architecture aspects (CMCC)**
* **R3-250816 (TP to TS 38.410 BL CR) A-IoT Architecture aspects (Nokia)**
* **R3-250818 (TP to TS 38.300 BL CR) Support of Inventory and command (Ericsson)**
* **R3-250819 (TP to TS 38.410 BL CR) Support of Inventory and command (ZTE)**
* **R3-250820 (TP to TS 38.413 BL CR) Support of Inventory and command (Huawei)**

**BL CR assignment:**

* **38300: CMCC (Miaoqi Zhang)**
* **38413: Huawei (Yan Wang)**
* **38410: ZTE (Zijiang Ma)**
* **38412: Xiaomi (Lisi Li)**
* **38401: Ericsson (Alexander Vesely)**

# Background

The following progresses were made during RAN3 Tue online session:

**RAN3 agrees to support both the direct and indirect options for the A-IoT RAN node to communicate with AIoTF in Topology 1.**

**WA: Take Option1 (Including AIoTF information in NGAP).**

**WA: The AIoT RAN node may only provide the AIoT radio.**

**AIoTF obtain the AIoT RAN information via OAM configuration. The AIoT RAN information includes supported AIoT area, served reader ID list.**

**The location of reader is FFS.**

**FFS on whether signaling is needed, further discussion on the detail information and necessity.**

**AIoT RAN node receives the requested service area information (encoded as area and/or reader ID list) from AIoT CN.**

**The behavior on the AIoT RAN on how to select the proper readers needs to be further discussed?**

How to encode the requested service area information is FFS.

Focus on the basic signaling procedures agreed in SI.

RAN2 agreements achieved so far in this meeting:

* RAN2 understands that the service type of A-IoT (e.g. inventory, command) and whether the service is targeted for a single or multiple devices can always be provided. The approximate number of target devices can be provided if available.
* Parallel service requests by the same reader is not supported.
* The device is expected to only perform one procedure at a time. FFS device behaviour if multiple requests are received in parallel (if needed).
* The “transaction ID” can be generated by reader based on CN corelation ID. FFS how reader will generate “transaction ID”. FFS the size of transaction ID
* 1 bit solution is excluded. FFS the size. Aim to have a reasonable size.
* RAN2 acknowledges that multi-reader scenario may exist but we will not specify something specific for this purpose. We can rely on transaction ID and implementation to handle it.

**Agreements on paging ID**

1. The “one identifier” in the paging message includes both the case of “one single device identifier” and “one group identifier”/”filtering criteria”, while the exact format of latter is supposed to be designed by SA2.
2. The current assumption is that the paging identifier is transparent to the A-IoT MAC Layer and carried by upper layer. FFS if there is really a need for visibility in the MAC layer

* the A-IoT paging message can include a number of msg1 resources
* For Rel-19, only 3-step CBRA is supported for A-IoT
* We will specify both CBRA and CFRA.
* For CBRA, it is up to Reader to decide whether to reuse the random ID as the AS ID or to assign a new AS ID. FFS how this is signalled, which message is used and size of AS ID.
* From device perspective, it is only required to use one AS ID.
* CFRA is not supported for group ID

# Discussion

## Leftover of online discussion

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| **WA: Take Option1 (Including AIoTF information in NGAP).**  **WA: The AIoT RAN node may only provide the AIoT radio.** |

* **Turn these WAs to agreements.**
* **Same handling of the AIOTF containers by the gNB and AIOTF are foreseen in both direct and indirect communications.**
* **AIoT RAN node is an aggregated gNB. And this gNB may or may not only provide the AIOT radio.**

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| **AIoTF obtain the AIoT RAN information via OAM configuration. The AIoT RAN information includes supported AIoT area, served reader ID list.**  **The location of reader is FFS.**  **FFS on whether signaling is needed, further discussion on the detail information and necessity.** |

* **The AIoT RAN information also includes the location of reader.**
* **AIOTF may be aware of the location of reader (FFS e.g. room number, GNSS info) via OAM configuration, and it is FFS on signaling.**
* **AIOTF may need to get the mapping of AIOT areas and readers. This can be obtain via OAM as part of the AIOT RAN information.**
* **To support selection of RAN node by AIOTF, define a new AIoT Area, or use Tracking Area dedicated for A-IoT?**
* **Define a new AIoT Area: FW, HW, QCOM, Xiaomi, CTC, Lenovo, NEC, CMCC**
* **User TAI dedicated for AIoT: E///, CATT, Nokia, SS**
* **One Reader only belongs to one Area, different Readers served by a gNB may belongs to different Areas.**
* **AIoTF may obtain some AIoT RAN information via OAM configuration. The AIoT RAN information may include supported AIoT area, served reader ID list.**

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| **AIoT RAN node receives the requested service area information (encoded as area and/or reader ID list) from AIoT CN.**  **The behavior on the AIoT RAN on how to select the proper readers needs to be further discussed?**  How to encode the requested service area information is FFS. |

* **Upon receiving only the area in Inventory Request, the gNB selects readers within the indicated area.**
* **Upon receiving neither the area list nor the reader list in Inventory Request, the gNB selects all the served readers.**
* **WA: Upon receiving only the reader list in Inventory Request, the gNB selects readers as indicated by the reader list.**

The following is FFS:

* Upon receiving both the area and the reader list in Inventory Request, the gNB selects the readers within the indicated areas and the readers within the reader list.

## LS to SA2 about questions in SA2 LSs:

**About S2-2501343/R3-250075:**

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| [Question to RAN3]  SA2 has concluded for topology 1, the AIOTF selects the AIOT RAN node(s) and optionally provides a list of the BS readers to AIOT RAN. SA2 assumes that OAM can configure the AIOTF with needed information for this selection. SA2 have further discussed whether the AIOT RAN may provide the AIOT RAN information e.g., supported AIOT RAN serving area, supported BS reader ID list and corresponding BS reader serving area to the core network.  SA2 kindly asks RAN3 to clarify whether RAN3 plan to support the above AIOT RAN information exchange with AIOTF. If so, SA2 kindly ask RAN3 to provide the definition of the appropriate parameters. |

* **Inform SA2 about related agreements achieved.**

**About S2-2413035/R3-250025**

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| **Issues in coordination with RAN WG:**   * The layer to enable AIoT Reader control, whether using NGAP or a layer above NGAP. |

* **Inform SA2 about related agreements achieved.**

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| **Issues in coordination with RAN WG:**   * Whether and how AIOTF selects BS readers or AIOT RAN nodes in topology 1 |

* **Inform SA2 about related agreements achieved.**

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| **Issues in coordination with RAN WG:**   * How addressing works for UL traffic (i.e. how the BS Reader identifies the appropriate AMF to which to forward UL messages) in the indirect path via AMF |

* **The gNB routes the UL signalling towards the AMF from which the inventory/command request was received.**
* **The gNB includes the AIOTF identifier received from the AIoT service request in the AIoT Service Response, to enable the AMF to perform UL traffic routing towards the corresponding AIOTF.**
* **Maybe? Sending a new LS with RAN WID code, not a reply LS with SID code.**
* Try to provide our progress in this meeting, a new LS with RAN WID code。
* Huawei

## Inventory procedures

* **Introduce a NGAP Class 1 Inventory Request procedure.**
* **Introduce INVENTORY REQUEST message, which includes Inventory Request Transfer IE.**
* **Introduce INVENTORY RESPONSE message, which includes Inventory Response Transfer IE.**
* **Introduce INVENTORY FAILURE messages, which includes Inventory Failure Transfer IE.**
* **Introduce a NGAP Class 2 Inventory Report procedure.**
* **Introduce INVENTORY REPORT message, which includes Inventory Report Transfer IE.**
* **The above Transfer IEs are transparent to AMF in case of indirect communication.**

**FFS:**

* **Include Correlation Identifier IE in all above messages, FFS inside or outside of the Transfer IE.**
* **In indirect communication, include the AIOTF Identifier IE in the all above messages.**

## About Command Procedure

* **Introduce a NGAP Class 1 Command Request procedure.**
* **Introduce COMMAND REQUEST message, which includes Command Request Transfer IE.**
* **Introduce COMMAND RESPONSE message, which includes Command Response Transfer IE.**
* **Introduce COMMAND FAILURE messages, which includes Command Failure Transfer IE.**
* **The above Transfer IEs are transparent to AMF in case of indirect communication.**

**FFS:**

* **The Correlation Identifier IE if included is the same one as in the related Inventory procedure.**
* **Command request procedure is a per device procedure or to be used for multiple devices?**
* **The need for a Command Report procedure?**
* **Include Correlation Identifier IE in all above messages.**
* **In indirect communication, include the AIOTF Identifier IE in the all above messages.**
* **Device association between gNB and AIOTF is used in Command Request procedure.**

## About Interface Management

* **In indirect path communication, existing NG interface management procedures are used between the gNB and the AMF.**
* **In direct path communication, existing NG Setup, RAN Configuration Update, NG Reset, Error Indication procedures are used between the gNB and the AIOTF.**

FFS:

* How to handle not applicable mandatory IEs
* How to handle AIOT only support case.

## About BL CR assignments

38300: CMCC

38413: Huawei

38410: ZTE

38412: Xiaomi

38401: E///

## About TPs

38300 for Architecture (CMCC)

* Take R3-250444 (E///), R3-250197(Huawei), R3-250685 (CMCC), R3-250108(CATT) into account

38410 for Architecture (impacts to 4.3, 4.4) (Nokia)

* Take R3-250197(Huawei), R3-250149(Xiaomi), R3-250441(Nokia) into account

38.300 for Inventory and command procedure (E///)

* Take R3-250444 (E///) into account

38410 for Inventory and Command procedure (ZTE)

* Take R3-250445(E///), R3-250149(Xiaomi), R3-250199 (Huawei), R3-250441(Nokia) into account

38413 for Inventory and command Procedures (Huawei)

* Take R3-250199 (Huawei), R3-250445(E///), R3-250560 (Nokia), R3-250109 (CATT), R3-250148(Xiaomi) into account

38412 for SCTP handling (Xiaomi)

* Take R3-250149(Xiaomi) into account

# References

1. R3-250197 (TPs for TS 38.300, TS 38.410 BL CRs) Ambient IoT RAN Architecture (Huawei, China Telecom, Lenovo, China Unicom)
2. R3-250095 Architecture, Protocols and Signaling to support ToR3-25pology 1 of A-IoT (Qualcomm Incorporated)
3. R3-250444 [TP for BL CR 38.300 and 38.401] Architecture for A-IoT RAN (Ericsson)
4. R3-250438 Ambient IoT Architecture (Nokia)
5. R3-250685 (TP to TS 38.300) Discussion on RAN Architecture for Ambient IoT (CMCC)
6. R3-250445 [TP for BL CR 38.413] NGAP protocol elemets for A-IoT (Ericsson)
7. R3-250120 Discussion on reader selection (ZTE Corporation)
8. R3-250119 Discussion on A-IoT procedures and content (ZTE Corporation)
9. R3-250096 Inventory and Command procedures for Topology 1 of A-IoT (Qualcomm Incorporated)
10. R3-250108 (TP to BL CR for TS 38.300) A-IoT protocol stack (CATT)
11. R3-250109 (TP to BL CR for XXAP) A-IoT Information exchange between A-IoT CN and A-IoT RAN (CATT)
12. R3-250110 Discussion on A-IoT reader selection (CATT)
13. R3-250118 Discussion on RAN Architecture (ZTE Corporation)
14. R3-250147 Discussion on support of AIoT (Xiaomi)
15. R3-250148 (TP for TS 38.413) Support of AIoT (Xiaomi)
16. R3-250149 (TPs for TS 38.410 and TS 38.412) Support of AIoT (Xiaomi)
17. R3-250183 Discussion on AIoT architecture aspects (NEC)
18. R3-250184 Discussion on AIoT procedures aspects (NEC)
19. R3-250198 (TP for TS 38.413 BL CR) NG Interface Management for Ambient IoT (Huawei, China Telecom, China Unicom)
20. R3-250199 (TPs to TS 38.413 TS 38.410 BL CRs) A-IoT Inventory procedures (Huawei, China Telecom, China Unicom)
21. R3-250200 (TPs to TS 38.410 TS 38.413 BL CRs) A-IoT Command procedures (Huawei, China Telecom, China Unicom)
22. R3-250286 On A-IOT Architecture and Interface (Lenovo)
23. R3-250287 On A-IOT Inventory Procedure (Lenovo)
24. R3-250288 On A-IOT Command Procedure (Lenovo)
25. R3-250352 A-IoT architecture aspects (China Telecom)
26. R3-250439 Signalling Information Elements for Inventory (Nokia)
27. R3-250440 Signalling Information Elements for Command (Nokia)
28. R3-250441 [TP for BL CR 38.410] AIoT procedures (Nokia)
29. R3-250446 [DRAFT] Reply LS on A-IoT Conclusions in SA WG2 (Ericsson) LS out To: SA2, RAN2
30. R3-250636 Discussion on RAN architecture and procedures for AIoT (Samsung)
31. R3-250643 Discussion on Signalling Procedure for Inventory and Command (China Telecom)
32. R3-250686 Discussion on Inventory Procedure and Signaling (CMCC)
33. R3-250687 Discussion on Command Procedure and Signalling (CMCC)
34. R3-250745 Discussion on Ambient IoT RAN Architecture (China Unicom)
35. R3-250013 LS on RAN2 outcome of Ambient IoT study (RAN2(Huawei))
36. R3-250025 LS on A-IoT Conclusions in SA WG2 (SA2(Huawei))
37. R3-250075 LS on SA2 Ambient IoT TR conclusion update (SA2(Huawei))
38. R3-250057 Further LS on Assistance information from CN to the reader (RAN2(ZTE))
39. R3-250069 Reply LS on Assistance Information from CN to the Reader (SA2(ZTE))
40. R3-250195 Consideration on SA2 Ambient IoT TR conclusion update (Huawei, China Unicom)
41. R3-250196 [Draft] Reply LS on SA2 Ambient IoT TR conclusion update (Huawei) LS out To: SA2
42. R3-250122 Discussion on SA2 Ambient IoT TR conclusion update (ZTE Corporation)
43. R3-250123[DRAFT] Reply LS on SA2 Ambient IoT TR conclusion update (ZTE Corporation) LS out To: SA2
44. R3-250442 On the LS from SA2 on Ambient IoT TR conclusion update (S2-2501343/R3-250075) (Ericsson)
45. R3-250443 [DRAFT] Reply LS on SA2 Ambient IoT TR conclusion update (Ericsson) LS out To: SA2
46. R3-250559 Analysis of SA2 AIoT TR configuration aspects (Nokia)
47. R3-250560 TP on information exchange for feedback on SA2 AIoT TR (Nokia)
48. R3-250561 Reply LS on SA2 Ambient IoT TR Conclusion Update (Nokia) LS out To: SA2
49. R3-250557 Analysis of AIoT Conclusions in SA WG2 (Nokia)
50. R3-250558 Reply LS on AIoT Conclusions in SA WG2 (Nokia) LS out To: SA2
51. R3-250657 Consideration on A-IoT Conclusions in SA WG2 (Huawei)
52. R3-250658 [Draft] Reply LS on A-IoT Conclusions in SA WG2 (Huawei) LS out To: SA2