**3GPP T****SG-RAN WG3 Meeting #126 R3-247795**

**Orlando, Florida, U.S., 18th – 22nd November 2024**

**Agenda Item: 16.3**

**Source: Moderator (Ericsson)**

**Title: [TP for TR 38.769] CB:#AIoT2\_SignallingFlow**

**Document for: Discussions & Approval**

# 1 Introduction

This TP represents the result of offline discussion on AIoT2\_SignallingFlow during RAN3#126.

Starting point, as tasked during the online session were documents R3-247786 and R3-247314.

# 2 Text Proposal

<<<<<<<<<<<<<<<<<<<< First Change >>>>>>>>>>>>>>>>>>>>

#### 6.5.1.3 A-IoT radio resource allocation in case of NAS/UP based solutions

In NAS/UP based solutions, there are different ways to trigger A-IoT session resource allocation, upon CN request or upon UE request.

Editor’s note: the feasibility of initial resource allocation upon UE request for non-UE associatd AIoT transaction requests needs further discussion.

A-IoT session resources can be requested by the AIoT CN in advance or in parallel to the NAS/UP based communication with the A-IoT device.

NOTE: In case of UE request, whether and how the A-IoT enabled gNB is informed about the A-IoT session when A-IoT enabled UE requests for A-IoT radio resources needs further discussion.

NOTE: There were also discussions about requesting AIoT session resources along with the NAS/UP based

communication. Details would need further discussions.

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#### 6.5.3.1 Candidate procedures for A-IoT Inventory for Topology 2

##### 6.5.3.1.1 RRC based solution



Figure 6.5.3.1-1: Message flow for A-IoT Inventory in Topology 2 - RRC-based solution

1a. The A-IoT CN sends an Inventory request message to the A-IoT enabled gNB

1b. The A-IoT enabled gNB allocates and coordinates usage of A-IoT radio resources.

1c/2a RRC communication with the A-IoT enabled UE takes place.

NOTE: RRC based communication is only depicted schematically, details subject to RAN2.

2. The A-IoT-enabled gNB sends an Inventory response message to the A-IoT CN.

NOTE 1: In step 2, the A-IoT-enabled gNB may instead send an Inventory failure message to the A-IoT CN indicating that the inventory procedure could not be initiated towards the A-IoT device(s).

3. The A-IoT-enabled gNB requests the A-IoT-enabled UE(s) to trigger inventory procedure towards the A-IoT device(s).

4a/4b. After receiving inventory result reported from the A-IoT enabled UEs, the A-IoT-enabled gNB may send one or multiple Inventory reports towards the A-IoT CN including the received inventory result.

NOTE 2: Steps 4a/4b may happen in parallel with Step 3 for different A-IoT devices.

NOTE: Step 4a/4b between A-IoT-enable UE and A-IoT-enabled gNB subject to RAN2.

##### 6.5.3.1.2 NAS/UP based solution

Editor’s NOTE: Whether and which of the following options will be finally considered needs further discussion.

NAS/UP based solution – A-IoT CN triggered A-IoT session resource allocation

Figure 6.5.3.1.2-2: Message flow A-IoT Inventory in Topology 2 - NAS/UP based solution – A-IoT CN triggered A-IoT session resource allocation

This option is characterised by the A-IoT enabled gNB receiving the request to establish A-IoT session resources by the A-IoT CN.

0a. The A-IoT CN requests A-IoT session resources.

0b. The A-IoT enabled gNB coordinates A-IoT radio resources and allocates A-IoT radio resources to the A-IoT enabled UE accordingly.

0c. The A-IoT enabled gNB confirms the request for A-IoT session resources.

NOTE 1: In step 0c, the A-IoT-enable gNB can reject the request for A-IoT session resource.

1. The A-IoT CN sends an Inventory request message to the A-IoT-enabled UE.

2. The A-IoT-enabled UE(s) sends an Inventory response message to the A-IoT CN.

NOTE 2: In step 2, the A-IoT-enabled UE may instead fail the Inventory request.

3. The A-IoT-enabled UE performs the inventory procedure towards the A-IoT device(s).

4/4b. The A-IoT-enabled UE may send one or multiple Inventory reports towards the A-IoT CN including the received inventory result.

NOTE 4: Steps 4/4b may happen in parallel with Step 3 for different A-IoT devices.

NAS/UP based solution – A-IoT enabled UE triggered A-IoT session resource allocation



Figure 6.5.3.1.2-1: Message flow for A-IoT Inventory in Topology 2 (if - NAS/UP based solution is used) – A-IoT enabled UE triggered A-IoT session resource allocation

This option is characterised by the A-IoT enabled gNB receiving the request to establish A-IoT session resources by the A-IoT enabled UE.

Additional means to enable the AIoT CN to provide AIoT session related information directly to the AIoT enabled gNB, not shown in Figure 6.5.3.1.2-1, may be needed.

Editor’s Note: Interaction between UE request and AIoT session control functions needs further discussion.

1. The A-IoT CN sends an Inventory request message to the A-IoT-enabled UE.

1a. The A-IoT enabled UE request A-IoT radio resources from the A-IoT enabled gNB.

1b. The A-IoT enabled gNB coordinates A-IoT radio resources and allocates A-IoT radio resources to the A-IoT enabled UE accordingly.

1c. The A-IoT enabled gNB responds the A-IoT radio resources to the A-IoT-enabled UE.

NOTE 1: In step 1c, the A-IoT-enable gNB can reject the A-IoT radio resource request. Details w.r.t. steps 1a and 1c are subject to RAN2 discussions.

2. The A-IoT-enabled UE sends an Inventory response message to the A-IoT CN.

NOTE 2: In step 2, the A-IoT enabled UE may instead send an Inventory failure message to the A-IoT CN indicating that the inventory procedure could not be initiated towards the A-IoT device(s), and the procedure ends.

3. The A-IoT-enabled UE(s) performs the inventory procedure towards the A-IoT device(s) over the A-IoT radio interface.

4/4b. After receiving inventory result reported from the A-IoT device(s), the A-IoT-enabled UE may send one or multiple Inventory reports towards the A-IoT CN including the received inventory result.

NOTE 3: Steps 4/4b may happen in parallel with Step 3 for different A-IoT devices.

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#### 6.5.2.x1 Candidate procedures for A-IoT Command in Topology 1



Figure 6.5.2.x1-1: Message flow for A-IoT Command in Topology 1

1. The Inventory procedures are performed in step 1, which are the same as in Figure 6.5.2.1-1 in step 1-4.

NOTE: Step 1 is performed for the “A-IoT Inventory and Command” case. Whether and under which conditions step 1 may be skipped in case of “Command-only” and which consequences this would have for the overall message flow depends on discussions led by SA2, SA3 and RAN2.

NOTE: Whether and which way steps 2a and 2b may be part of step 1 is dependent on discussions led by SA2, SA3 and RAN2.

2a. The A-IoT CN node sends a Command Request message to the A-IoT RAN.

2b. The A-IoT RAN node coordinates the usage of A-IoT radio resources and allocates A-IoT radio resources for the A-IoT command session.

3. The A-IoT RAN node performs A-IoT command procedures towards the A-IoT device over the A-IoT radio interface.

4. The A-IoT RAN node sends a Command Response message to the A-IoT CN, if any command result is received from A-IoT device, the A-IoT RAN node may include the command result in the Command response message.

NOTE: In step 4, the A-IoT RAN node may instead send a Command Failure message to the A-IoT CN indicating that the command procedure has failed.

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#### 6.5.3.x1 Candidate procedures for A-IoT Command for Topology 2

##### 6.5.3.x1.1 RRC based solution



Figure 6.5.3.x1-1: Message flow for A-IoT Command in Topology 2 (RRC-based solution)

1. The Inventory procedures are performed in step 1, which are the same as in Figure 6.5.3.1-1 in step 1-4.

NOTE: Step 1 is performed for the “A-IoT Inventory and Command” case, Whether and under which conditions step 1 may be skipped in case of “Command-only” and which consequences this would have for the overall message flow depends on discussions led by SA2, SA3 and RAN2.

NOTE: Whether and which way steps 2a, 2b and 2c may be part of step 1 is dependent on discussions led by SA2, SA3 and RAN2.

2a. The A-IoT CN sends a Command Request message to the A-IoT enabled gNB.

2b. The A-IoT enabled gNB coordinates A-IoT radio resources and allocates A-IoT radio resources to the A-IoT enabled UE accordingly.

2c. The A-IoT enabled gNB sends a RRC Command Request message to the A-IoT enabled UE.

NOTE: RRC based communication, i.e. performing the A-IoT Command procedure and allocation of A-IoT radio resources, is only depicted schematically, details subject to RAN2.

3. The A-IoT-enabled UE performs A-IoT command procedures at A-IoT interface towards the A-IoT device over the A-IoT radio interface.

4a. A-IoT enabled UE sends a Command Response message to A-IoT enabled gNB, if the command result is received from A-IoT device, the A-IoT enabled UE may include the command result in the Command Response message.

4b. The A-IoT enabled gNB sends a Command Response message to the A-IoT CN, it may include the command result in the Command Response message, if any.

NOTE: In step 4b, the A-IoT enabled gNB may instead send a Command Failure message to the A-IoT CN indicating that the command procedure is failed towards the A-IoT device.

##### 6.5.3.x1.2 NAS/UP based solution

The A-IoT Command procedure also applies to the NAS/UP based solutions, and the AIoT Command procedure signallings are exchanged between the A-IoT enabled UE and the AIoTF over UE’s NAS/PDU session. The A-IoT session resource allocation steps described in 6.5.3.1.2 also applies to this procedure.

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