**3GPP T****SG-RAN WG3 Meeting #125bis R3-245723**

**Hefei, P.R. China, 14th – 18th October 2024**

**Agenda Item: 16.3**

**Source: Ericsson**

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

**Document for: Discussions & Approval**

# 1 Introduction

This document is the summar of offline discussion **CB: # AIoT2\_RANCNinterface**

**- Check the details in** [**R3-245307**](Inbox\R3-245307.zip)**, taking** [**R3-245581**](Inbox\R3-245581.zip) **into account**

**- Continue the discussion on reader selection for Topology1 and Topology2 based on progress in RAN2**

(moderator - E///)

It contains a TP for 38.769.

# 2 Text Proposal for TR 38.769v1.0.0

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

### 6.5.1 Information exchanged between A-IoT CN and A-IoT RAN

#### 6.5.1.x XX Information common to AIoT transactions

(x.1) A-IoT Device Identification

- Dependent on the use case, it may concern only a single device or multiple devices.

(x.2) Scope of the AIoT Transaction

- Allows NG-RAN to select the readers necessary to perform the AIoT transaction

- May contain one or several of the following items: geographical information, AIoT Transaction Area ID(s) (associated with a reader ID), in the context of topology 2 deployments: NR Cell ID(s).

Editor’s Note 1: Further definition of the Scope of AIoT Transaction and AIoT Transaction Area ID is FFS.

(x.3) Reader ID

- Allows AIoT CN and AIoT RAN to communicate latest know location of an AIoT device on reader ID granularity

Editor’s Note 2: Further definition of the Reader ID is FFS.

(x.4) AIoT Transaction ID

- Allows AIoT RAN and AIoT CN to address different, potentially concurring AIoT transactions

- If the AIoT transaction is initiated by the AIoT CN, the AIoT Transaction ID is allocated by the AIoT CN and should be uniquely identifiable for a certain amount of time at least among the readers involved in AIoT transactions initated by the AIoT CN.

- If the AIoT transaction is initiated by the AIoT RAN, the AIoT Transaction ID is allocated by the AIoT RAN and should be uniquely identifiable for a certain amount of time at least among the readers involved in AIoT transactions initated by readers served by the AIoT RAN.

(x.5) AIoT upper layer PDU

- Transparent Container, passed unaltered from the AIoT CN to the Reader(s)/AIoT device(s).

#### 6.5.1.1 Inventory

Inventory can be sent by the A-IoT CN for a single device, or a group of devices, or all devices.

The **Inventory Request** from the A-IoT CN to the A-IoT RAN, includes the following:

(1) AIoT Transaction ID (CN allocated)

(2) A-IoT Device Identification

- contains the ID of a single device ID, multiple IDs, a group of devices, or an indication that all devices are concerned

Editor’s Note 1: It is FFS whether A-IoT RAN needs to interpret/store/process it.

(3) Scope of AIoT transaction

Editor’s Note 2: It is up to SA2 whether device ID is sent transparent or not.

The **Inventory Response** from the A-IoT RAN to the A-IoT CN, includes the following:

(1) AIoT Transaction ID (AIoT CN allocated)

The **Inventory Report** from the A-IoT RAN to the A-IoT CN, includes the following:

(1) AIoT Transaction ID (AIoT CN allocated)

(2) A-IoT Device Identification

(3) (optional) Reader ID(s) involved in the Inventory transaction of the device indicated in (2)

#### 6.5.1.2 Command

Command can be sent by the A-IoT CN for a single device.

Editor’s Note 1: it is FFS for command on a group of devices, or all devices.

Editor’s Note 2: it is FFS whether A-IoT RAN can remain agnostic of the type of request from the A-IoT CN (need to differentiate command and inventory)

#### 6.5.1.3 XX protocol elements for AIoT resource allocation in case of NAS/UP based solutions

NAS/UP based solutions require the possibility for requesting AIoT resources in advance to the NAS/UP based communication with the AIoT device.

XX AIoT resource allocation does not need to carry AIoT device specific information, but only sufficient information in order to configure the AIoT enabled UEs with respective AIoT resources.

The **AIoT Resource Request** and the **AIoT Resource Response** message shall carry the same AIoT Transaction ID (CN allocated) as communicated by the AIoT CN directly to the AIoT enabled UE(s).

Editor’s Note 1: Further details are FFS.

<<<<<<<<<<<<<<<<<<<< Next Change >>>>>>>>>>>>>>>>>>>>

### 6.5.2 Signaling and Procedures for Topology 1

#### 

Editor’s note 1: Future discussions on A-IoT Inventory will take place based on the following message flows, working on the content of the messages including ownership, associated functions, scope, etc.

Editor’s note 1: XX communication depicted in the following chapters uses protocol elements (messages and information elements) detailed in section 6.5.1 and are not repeated, unless additional description is necessary.



Figure 6.4.2.1-1: Message flow for AIoT Inventory in Topology 1

0. The AIoT CN selects the scope for Inventory

1a. The AIoT CN sends an Inventory request message to the AIoT RAN node.

1b The AIoT RAN selects the appropriate reader(s).

1c The AIoT RAN allocates and coordinates usage of AIoT radio resources.

2. The AIoT RAN node sends an Inventory response message to the AIoT CN.

NOTE 1: In step 2, the AIoT RAN node may instead send an Inventory failure message to the AIoT CN Indicating that the inventory procedure could not be initiated towards the AIoT device(s).

3. The AIoT RAN node initiates the inventory procedure towards the AIoT device(s) over the AIoT radio interface.

4a/4b. After receiving the inventory result from the AIoT device(s), the AIoT RAN node may send one or multiple Inventory reports towards the AIoT CN including the received inventory result.

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

<<<<<<<<<<<<<<<<<<<< Next Change >>>>>>>>>>>>>>>>>>>>

### 6.5.3 Signaling and Procedures for Topology 2

Editor’s note 1: Future discussions on A-IoT Inventory will take place based on the following message flows, working on the content of the messages including ownership, associated functions, scope, etc.

Editor’s note 3: XX communication depicted in the following chapters uses protocol elements (messages and information elements) detailed in section 6.5.1 and are not repeated, unless additional description is necessary.

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

##### 6.5.3.1.1 NAS/UP solution option 1 – AIoT enabled UEs requesting AIoT radio resources



Figure 6.5.3.1.1-1: Message flow for an A-IoT Inventory in Topology 2 – NAS/UP solution option 1

0 The AIoT CN selects AIoT enabled UE(s) for Inventory.

1a. The AIoT CN sends an Inventory request message to the selected AIoT-enabled UE(s).

1b. Direct communication between the AIoT CN and and the AIoT enabled UE(s) – as of the NAS/UP solution – requires the AIoT enabled UE(s) to first request AIoT radio resources for the transaction.

1c AIoT RAN allocates and coordinates usage of AIoT radio resources among the AIoT enabled UE(s) requesting resources.

Editor’s Note 1: AIoT RAN needs to learns about the AIoT transaction and the involved AIoT enabled UEs gradually from the AIoT enabled UEs requesting, details FFS.

1d AIoT RAN replies to the AIoT enabled UE(s)

NOTE 1: RRC based communication is only depicted schematically.

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

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

3. The AIoT-enabled UE(s) trigger the inventory procedure towards the AIoT device(s).

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

NOTE 3: Steps 4a/4b may happen in parallel with Step 3 for different AIoT devices.

##### 6.5.3.1.2 NAS/UP solution option 2 – RAN allocating AIoT radio resources



Figure 6.5.3.1.2-1: Message flow for A-IoT Inventory in Topology 2 – NAS/UP solution option 2

0a The AIoT CN selects the scope for Inventory.

0b. Direct communication between the AIoT CN and and the AIoT enabled UE(s) – as of the NAS/UP solution – requires the AIoT CN to first request AIoT radio resources for the transaction.

0c The AIoT RAN selects the appropriate reader(s).

0d The AIoT RAN allocates and coordinates usage of AIoT radio resources.

0e/f. If AIoT radio resources are admitted by the AIoT enabled gNB, the AIoT enabled UE is configured with AIoT resources it is allowed to use. Respective RRC signalling needs to carry information to allow association with information provided in step 1.

NOTE 1: RRC based communication is only depicted schematically.

0g. The AIoT RAN responds to the resource request and provides the list of selected and configured AIoT enabled UEs to the AIoT CN.

1. The AIoT CN sends an Inventory request message to the AIoT-enabled UE(s).

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

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

3. The AIoT-enabled UE(s) trigger the inventory procedure towards the AIoT device(s).

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

NOTE 3: Steps 4a/4b may happen in parallel with Step 3 for different AIoT devices.

##### 6.5.3.1.3 RRC solution



Figure 6.5.3.1.3-1: Message flow for A-IoT Inventory in Topology 2 – RRC solution

0. The AIoT CN selects the area for Inventory.

1a. The AIoT CN sends an Inventory request message to the AIoT RAN node.

NOTE 1: The AIoT CN may provide assistance information to optimise inventory, e.g. indicating last known Reader(s) communicating with an AIoT device.

1b The AIoT RAN selects the appropriate reader(s).

1c The AIoT RAN allocates and coordinates usage of AIoT radio resources.

1d/2a RRC communication with the UE Reader takes place

NOTE 2: RRC based communication is only depicted schematically

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

NOTE 3: In step 2, the AIoT-enabled gNB may instead send an Inventory failure message to the AIoT CN indicating that the inventory procedure could not be initiated towards the AIoT device(s).

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

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

NOTE 4: Steps 4a/4b may happen in parallel with Step 3 for different AIoT devices.

<<<<<<<<<<<<<<<<<<<< End of Changes >>>>>>>>>>>>>>>>>>>>