**3GPP TSG-WG SA2 Meeting #168 *S2-250XXXX***

**Goteborg, SE, 7th April – 11th April, 2025 merger of 3012+3049+3385+3857+3692+3838**

**Source: China Mobile**

**Title: pCR for TS 23.369: AIoT Reader Selection**

**Document for: Approval**

**Agenda Item: 19.14.2**

**Work Item / Release: AmbientIoT-ARC / Rel-19**

*Abstract: address ENs about AIoT Reader Selection*

# 1. Introduction/Discussion

 LS from RAN3 (R3-250905):

RAN3 would like to inform SA2 and SA5 about the following RAN3 progress related to Architecture and OAM aspects:

* A-IoT RAN node is an aggregated gNB. And this gNB may or may not only provide the A-IoT radio.
* Support both the direct and indirect communication options between the gNB and the AIOTF in Topology 1.
* Working assumption: Including AIOTF information containers in NGAP, rather than introducing new protocol carried by NGAP.
* It is FFS whether to define a new A-IoT Area, or use Tracking Area dedicated for A-IoT, to support e.g., the selection of gNBs by the AIOTF.
* AIOTF obtains the A-IoT RAN information (supported Area, served reader ID list) via OAM configuration, FFS on RAN3 signalling for the A-IoT RAN information.
* AIOTF may also be aware of the other A-IoT RAN information (location of reader) via OAM configuration, FFS on RAN3 signalling for the other A-IoT RAN information...
* In Inventory Request, gNB receives the requested Service Area Information (encoded as Area and/or reader ID list) from AIOTF.
* The gNB always sends the A-IoT device’s location at reader ID granularity to the AIOTF in Inventory Report.
* “Global gNB ID + Reader index" is used to uniquely identify the Reader globally.

As RAN3 concluded, AIOTF obtains the A-IoT RAN information (supported Area, served reader ID list) via OAM mechanism. The Inventory Request includes the requested supported area Information (encoded as Area and/or reader ID list).

The following 2 ENs can be resolved.

Editor’s note: Whether and how the AIOTF chooses the RAN reader(s) is FFS.

Editor’s note: AIoT RAN and RAN reader information needs to coordinate with the RAN WG(s). Details are pending RAN WG feedback.

**Proposal 1: The AIOTF selects the AIoT RAN node(s) and, optionally, AIoT RAN’s requested area information ( Area and/or AIoT reader ID list) based on the internal area information in the service request and its local configurations via OAM.**

The operator and AF need to coordinate to be aware of the AIoT RAN’s supported area granularity information. AF uses the external target area information to represent one or multiple the AIoT RAN’s supported service areas. The NEF needs to convert this information into internal area information (e.g., RAN’s supported area) based on match between external target area information and its local configurations via OAM. Local configuration has the mapping relationship between target area information and RAN’s supported area.

AF may use the physical Area (e.g., Geo-location --civic address or polygon with coordinates) or Area ID to represent external target area information. However, the target area information provided by the AF has to be completely match one or more AIoT RAN’s supported areas. It can’t be partial match of the one AIoT RAN’s supported area. If it is a partial match of the one AIoT RAN’s supported area, the core network can’t instruct the AIoT RAN reader to inventory only designated physical area. From the AF side, it expects the AIoT system to inventory the designated physical area only, but the RAN readers just can inventory one or more complete supported areas. Then, it means that the product items, not in designated physical area requested by AF, will be reported to AF unexpectedly.

The relationship between the target area information (e.g., physical area or Area ID) and the internal area information (e.g., RAN’s supported area) is established collaboratively by the operator and AF. This is based on factors such as the supported area(s) from AIoT RAN,and corresponding external target area from AF.

**Proposal 2: AF may provide target area information in the format of location identifier or Physical Area. NEF converts the target area information into internal area information (e.g., RAN’s supported service area) based on local configuration.**

NOTE: The target area information provided by the AF needs to completely match one or more of the AIoT RAN’s supported areas. It cannot be a partial match of a single AIoT RAN’s supported area.

NOTE: The mapping relationship between the target area information and the internal area information (e.g., RAN’s supported service area) is determined collaboratively by the operator and AF, based on factors such as the AIoT RAN’s supported areas and external target area information.

Then, the following 2 ENs can be resolved.

Editor’s note: It is FFS how to handle the case that the AF provides other information than target area information, for the purpose of reader selection. In such case how the NEF and/or AIOTF use it to select the RAN reader.

Editor’s note: How the NEF converts target area information to internal area information and the format of the internal area information is FFS.

The two ENs below are related to RAN3 signalling for A-IoT RAN information. Based on LS from RAN3, it is in FFS.

Editor’s note: The AIOTF or AMF configuration of AIoT RAN and RAN reader information over NGAP needs to coordinate with RAN WG(s).

Editor’s note: It is FFS how AIoT RAN transfers and updates its information to the AIOTF in indirect path.

**Proposal 3: FFS on RAN3 signalling for the AIoT RAN information. Merge the two ENs.**

# 2. Text Proposal

It is proposed to capture the following changes in TS 23.369 v0.2.0.

\* \* \* \* First change \* \* \* \*

5.3 AIoT Reader Selection

The AIOTF is responsible for selecting AIoT readers for authorized inventory requests or commands it receives.

For AIoT RAN connectivity, the AIOTF selects AIoT RAN node(s) and, optionally, a list of the requested service area information (e.g., Area or AIoT RAN reader ID list). The AIOTF selects the AIoT RAN node(s) or requested service area information based on the internal area information (e.g., AIoT RAN’s supported area) and local configurations (e.g., AIoT RAN information).

The AIOTF sends the service request to the selected AIoT RAN node(s), including the requested Service Area Information, either directly or through the selected AMF. If multiple AIoT RAN nodes are selected, the AIOTF sends the service request to each selected AIoT RAN node along with its corresponding requested service area information.

If the AIOTF does not provide the requested service area information in the AIoT service request to the AIoT RAN, then the AIoT RAN uses all available AIoT RAN readers.

NOTE: The AIoT RAN Reader ID includes information about the AIoT RAN node ID. The AIOTF can retrieve the AIoT RAN node based on the AIoT RAN reader.

NOTE: The AIOTF can obtain the AIoT RAN information (AIoT RAN’s supported area, served AIoT RAN reader ID list, and optionally the location of each served AIoT RAN reader) via OAM configuration.

The AF may provide the target area information (e.g., Area ID or physical area) in the AIoT service request. The NEF converts the target area information received from the AF into the internal area information (e.g., AIoT RAN’s supported area) based on local mapping configuration.

The NEF acquires the serving AIOTF based on local configuration or a query sent to the NRF using the internal area information. Then, the NEF sends the AIoT service request, including the internal area information, to the serving AIOTF.

Editor’s note: FFS on RAN3 signaling for the AIoT RAN information.

NOTE: AIoT RAN reader information is not exposed to the AF.

NOTE: If the service request from AF does not include target area information, then the NEF can determine the default target area information based on the NEF implementation and operator policy.

If an AIoT service request includes AIoT device Identifier(s), the AIOTF may consider the last known AIoT RAN reader(s) to determine targeted AIoT RAN reader(s) directly.

From the selected AIoT RAN, the AIOTF receives the Inventory Report including the AIoT RAN reader ID that represents the AIoT device’s location at reader ID granularity. The AIOTF uses the AIoT RAN reader ID to update the last known AIoT RAN reader information in the local AIoT device context.

\* \* Second change \* \* \* \*

## 5.X AIOTF Selection

The NEF is responsible for AIOTF selection for the authorized inventory request or command requests it receives.

The AIOTF registers itself in the NRF with its NF profile, this includes the

- AIOTF ID/address,

- NF type,

- Service Area (Supported Area(s) of all connected NG-RAN(s) or Serving scope (e.g., geographical location)).

The NEF discovers and selects the AIOTF instances via NRF or local configuration based on the target area information included in the request it received. If the request from AF did not include target area information, then the NEF may select the AIOTF based on available last known AIOTF information in target device profile data, NEF implementation and operator policy.

\* \* \* \* Third change \* \* \* \*

## 5.Y AMF Selection for indirect connectivity architecture

For indirect connectivity architecture (i.e., the AIOTF connects indirectly to AIoT RAN via an AMF), the AIOTF is responsible to select the AIoT capable AMF to relay the NGAP messages to/from the target NG-RAN nodes.

The AMF that is capable of Ambient IoT service can register its support of AIoT service as part of its NF profile in the NRF. If the AIOTF connects to AIoT RAN via an AMF, the AIOTF can discover the AIoT capable AMF via NRF, and then the AIOTF, based on local configuration, selects the AMF that connects the selected NG-RAN node(s)/RAN reader(s).

NOTE: The local configuration contains the topologies between AMF and AIoT RAN, this is achieved via OAM configuration.

\* \* \* \* Fourth change \* \* \* \*

## 5.Z ADM Selection

The AIOTF is responsible for ADM selection. The following factors may be considered during the ADM selection:

- AIoT Device Permanent ID,

- local configuration,

- 3rd party related context.

\* \* \* \* End of changes \* \* \* \*