**3GPP TSG-WG SA2 Meeting #164 *S2-240xxxx***

**Maastricht, NL, 19th Aug – 23rd Aug, 2024 (revision of S2-2408554)**

**Source: Huawei, HiSilicon**

**Title: Conclusion on key issue 1 for topology 1 architecture**

**Document for: Approval**

**Agenda Item: 19.14.1**

**Work Item / Release: FS\_AmbientIoT / Rel-19**

*Abstract: conclusion principles are proposed on key issue 1 for topology 1 architecture.*

# 1. Introduction/Discussion

For KI#1, Topology 1 there the following conclusion proposals have been made based on the inputs:

S2-2407595:

- A new AIoT Function (AIoTF) entity is introduced to support AIoT Services.

- AIoTF may interact with A-RAN directly via a new defined Nxx interface or AIoTF may interact with A-RAN via AMF (transparent or not).

NOTE: Cooperation with RAN3 is required to decide the interface between A-RAN and AIoTF.

- AIoTF interacts with AIoT Device via AIoT NAS message.

S2-2407678:

The AIoT feature may be deployed as a standalone AIoT network or being integrated into an existing network. The defined AIoT feature should not exclude any deployment ways.

In order to support a standalone AIoT network, the reference architecture should include the following NFs:

* In case of the standalone network with both topology 1 & 2, both AIoT Function and the AMF should be included and it is recommended the two NFs are collocated.
* In case of the standalone network with both topology 1 only at the beginning, AIoT Function should be included and AMF is also required in order to compatible to the future deployment of UE reader as the coverage supplement. Otherwise, it has to either upgrades the CN to make UE reader access or introduce more new BS readers to cover the small blind area. Both ways are not economic.

Editor's note: The other NFs are FFS.

In order to support the AIoT feature is integrated into a PLMN network, the reference architecture should further support an AIoT Function.

Editor's note: The other NFs are FFS.

S2-2307679:

The interface between CN and two kinds of BS reader is still NG interface, but there may be new NGAP procedure to support AIoT features.

The BS reader may be an AIoT access system which supports a list of readers. The BS reader provide the supporting reader ID list or serving area list for AIoT service to the AMF and the AMF updates that information to the NRF via NF profile update procedure.

Both reader ID list or serving area list can be used to select the BS reader.

S2-2408042:

* A new logical network function, AIoT Function, is introduced to enable AIoT services in 5GC. AIoT Function applies to both Topology 1 and 2. The figure 6.4.1.4.1-1 of Solution 4 is considered as the baseline reference architecture.
* The AIoT service procedures and information exchange is supported with existing NAS, NGAP protocols with enhancements, for both Topology 1 and 2.
* For Topology 2, both CP-based and UP-based solutions are supported.

S2-2408248:

* Common for topology 1 and 2:
* Topology 1 and topology 2 are supported by the same system architecture.
* A new NF (i.e., AIoTF) in 5GG is defined to support AIoT communication.
* Topology 1:
* The BS communicates with the NF responsible AIoT service handling via AMF over N2 interface.

S2-2408296:

Regarding Architecture support of Ambient IoT Devices, it is proposed to move to normative phase the following principles:

- The Architecture to support Ambient IoT Devices is similar to 5GC, which includes the following scenarios:

- Online-subscription from 3rd party (AF): Service Related Data is provisioned to MNO.

- Deployment of Ambient IoT Devices may be done, before Online-subscription or

- Bulk Provisioning (Group Registration) of Dvices including authentication of devices is done.

- Device-to-Device Data Transfer may be used from the Device to Base.

- Shared PDU Session establishment is done.

- Data Transfer between AF and Devices through MNO is done.

S2-2408443:

It is proposed for supporting Ambient IoT services without interfering with existing deployments a new slice service type is introduced. The new slice service type is used to route traffic to an AMF/AIoTF designated to Ambient IoT services.

S2-2408554:

- A new core network function, AIoTMF, is introduced to support Ambient IoT

- The AIoTMF communicates with a BS reader via a direct interface called AIoT-NGAP

- AIoT-NAS protocol is used between an Ambient IoT Device and the AIoTMF

- UDM or AAA Server is responsible for management of Ambient IoT Device subscription-like information

- NEF is responsible for Ambient IoT service exposure to third-party AF

**Summary:**

In the conclusion proposals, for those that mention it, there looks to be support for a new NF to support AIoT and the majority indicate that new NF communicates directly with a RAN Reader.

There is support for allowing the network to be deployed as “standalone” or isolated from an existing network, with some differing proposals for how “standalone” or isolation is achieved.

Some companies indicate a NAS protocol is supported between the AIoT Device and the new NF.

Although not included in many proposals, exposure or handling of data to/from the AIoT is proposed be handled by the CN/MNO. For many that did not mention this aspect directly, this seems to be a basis on which their proposals are made.

There seems to be a basis in some conclusion proposals for the CN to manage and hold information about the AIoT Devices.

Other aspects mentioned in a small number of proposals include reader identification, provisioning of information to the CN, handling (i.e. service related data, subscription-like information) and details of the routing (e.g. CP vs UP, shared PDU Sessions, etc) are included, but there does not look to be enough considerations or support to include them at this time.

# 2. Text Proposal

It is proposed to capture the following changes vs. TR 23.700-13.

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

## 8.b Conclusion on Key Issue #1

### 8.b.1 Architecture to Support Topology 1

Key issue #1 includes the following aspects:

- System architecture identified along with the solutions for KI#2 and KI#3.

Key issue#2 aspect on “Ambient IoT Device subscription management” and key issue#3 aspect on “Ambient IoT service exposure” is considered in this section.

At least the following principles are agreed for the architecture to support topology 1:

- A new core network function, AIoTF, is introduced to support Ambient IoT.

- The AIoTF can communicate with a BS Reader via a direct interface.

Editor’s Note: The details of the direct interface between the AIoTF and the RAN Reader are still to be concluded.



Figure 8.b.1-1: illustrative architecture for topology 1

- The AIoT feature may be deployed as a standalone AIoT network or being integrated into an existing network. The defined AIoT features should not exclude any deployment ways.

- A new AIoT-NAS protocol (different from the existing 5GS NAS protocol) is used between an Ambient IoT Device and the AIoTF.

- The CN (e.g. UDM, etc) is responsible for management of Ambient IoT Device subscription-like information.

- The CN is responsible for Ambient IoT service exposure to third-party AF, including data transfer.\* \* \* \* End of changes \* \* \* \*