**3GPP TSG-WG SA2 Meeting #171 *S2-250xxxx***

**Wuhan, CN, 13th Oct – 17th Oct, 2025 (revision of S2-250xxxx)**

**Source: Huawei, HiSilicon**

**Title: Interim Conclusions Proposals for Key Issue 2**

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**Work Item / Release: FS\_AmbientIoT\_Ph2\_ARC / Rel-20**

*Abstract: this pCR discusses several essential aspects of Rel-20 Ambient IoT work, and proposes interim conclusions accordingly.*

# 1. Introduction

Rel-20 SA2 Ambient IoT study includes the work task for support of DO-A Capable AIoT Devices, and the corresponding key issues are agreed in SA2#170 as follows:

- How the AIoT Device informs the network of its presence autonomously (e.g., an AIoT Device initiated registration-like procedure) and what are the triggers for the DO-A capable device to inform the network of its presence.

- Whether and how to consider power consumption of DO-A Capable AIoT Devices.

- How an AIoT Device sends data to the AIOTF autonomously.

- Support for routing the data received by AIOTF from an AIoT Device to an AF.

- Whether and how to enhance the Inventory and Command procedures defined in TS 23.369 [3] to support DO-A capable AIoT Devices.

- Naiotf, Namf and Nnef interface enhancements to support DO-A capable AIoT Device.

NOTE 1: The conclusions from Key Issue #1 are the basis for supporting DO-A capable AIoT Devices in topology 2 in this key issue.

NOTE 2: Coordination with RAN WGs is required.

During the discussion at SA2#170, several general design principles for key issue 2 have been considered. Before working on the details, it is important to reach common understanding on the essential aspects of the overall work.

Following are the essential aspects for key issue 2 from our point of view:

1. DO-A capable AIOT Device characteristics,

2. Rel-20 AIoT service enabler in the network,

3. RAN aspect design principles.

# 2. Considerations for Rel-20 Ambient IoT study work

## 2.1 Active and Passive Capability

In the SA2 SID, the scope of Rel-20 Ambient IoT Device is for DO-A capable device. From SA2 point of view, DO-A capable device is equivalent to “active device” in RAN SID/WID description, which is an AIoT Device that supports autonomous carrier wave generation. It is observed RAN has a clearly distinguish passive devices and active devices in terms of carrier wave generation, which means the active device cannot support backscatter communication.

**Proposal 1:** **DO-A capable AIoT Device cannot fallback to being a passive device in any cases.**

## 2.2 DO-A capable AIoT Device Complexity

As stated in R20 RAN AIoT WID RP-251885:

*As with earlier Releases, Rel-20 A-IoT technology shall provide complexity and power consumption orders of magnitude lower than the existing 3GPP LPWA technologies (e.g. NB-IoT and eMTC), and the features of 6G relevant to IoT, and shall address use cases and scenarios that cannot otherwise be fulfilled based on existing 3GPP LPWA IoT technologies.*

DO-A capable AIoT Device shall be less complex than an NB-IOT UE, according to RAN decision.

**Proposal 2: DO-A capable AIoT Device is less complex than an NB-IoT UE, including no support for user plane data transfer and PDU sessions.**

## 2.3 DO-A capable AIoT Device Identifiers

AIoT Device Permanent Identifier is supported by Rel-19 AIoT Devices, which is one of the key aspects to enable AIoT services. For example, filtering information can be generated to be compared with AIoT Device Permanent Identifiers and is used to perform an inventory procedure targeting multiple AIoT Devices. It is agreed in SA2#170 that Rel-20 Ambient IoT will continue to support AIoT inventory and command procedures, therefore an AIoT Device Permanent Identifier should be supported by DO-A capable AIoT Devices.

**Proposal 3: DO-A capable AIoT Devices have an AIoT Device Permanent Identifier.**

## 2.4 Protocol between Rel-20 AIoT Device and AIoT core network

Rel-19 Ambient IoT architecture includes the AIOT1 reference point between an AIoT Device and an AIOTF that uses the AIoT NAS protocol.

In addition to support AIoT Inventory and Command services, Rel-20 AIoT will support new features like AIoT Device initiated registration-like procedures and DO-A communication related procedures. Looking at all the solution proposals for key issue 2, it is observed that a common design aspect is the AIOTF supports the AIOT NAS protocol with a DO-A capable AIoT Device .

**Proposal 4: The AIOT1 reference point between an AIoT Device and AIOTF is used and supports the AIoT NAS protocol in the Rel-20 Ambient IoT architecture.**

## 2.5 AIoT Service Enablers in the Network

Rel-20 Ambient IoT architecture supports the following traffic types:

- DT: Device-terminated;

- DO-DTT: Device-originated - device-terminated triggered; and

- DO-A: Device-originated - autonomous.

DT and DO-DTT traffic types are used to support AIoT Inventory and commands (i.e., read/write/disable) in Rel-19. A Rel-19 AIoT Device has ultra-low complex and it cannot support any application layer design, therefore, the AIoT service logic assumes a simple memory access model and parameters for read and write such as memory address, offset, are signalled by the AIOTF using AIOT NAS. It means the network is designed to support particular AIoT service operation, in addition to provide a transport between the AIoT Device and AF.

Rel-20 supports DO-A communication, it is used by an AIoT Device to transfer data (e.g., sensor data) to the AF. For this type of AIoT service, it is proposed that the network functionality is to provide a transport for any data between the AIoT Device and AF. It is not necessary for the network to be involved in the data model, like device memory handling.

**Proposal 5: For DO-DTT and DT traffic type, Rel-19 design principles are reused. For DO-A traffic type, the network provides a transport between the AIoT Device and AF for data transfer and does not need to understand AIoT service specific (e.g., sensor application) logic.**

## 2.6 RAN Design Principle to Enable DO-A Type of Communication

SA2 will define end-to-end DO-A procedures, for example, an AIoT Device initiated registration-like procedure. Since the RAN work will start later, it is important to confirm that RAN aspect will support DO-A specific procedures.

It is observed in R20 RAN AIoT WID RP-251885 includes the following objective for topology 1:

**RAN2-led**

* DO-A specific procedure design.
* Paging and random access for active device(s).

**RAN3-led**

* Specify DO-A specific NGAP procedure.

**Proposal 6:** **Rel-20 RAN design is assumed to include DO-A specific procedures, which can support SA2s end-to-end DO-A procedures.**

# 3. Conclusion and proposal(s)

It is proposed to agree the following proposals in TR 23.700-30.

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

### 7.1.Y Agreed Principles for KI#2

Following principles are agreed for key issue 2:

* DO-A capable AIoT Device cannot fallback to being a passive device in any cases.
* DO-A capable AIoT Device is less complex than an NB-IoT UE, including no support for user plane data transfer and PDU sessions.
* DO-A capable AIoT Devices have an AIoT Device Permanent Identifier.
* The AIOT1 reference point between an AIoT Device and AIOTF is used and supports the AIoT NAS protocol in the Rel-20 Ambient IoT architecture.
* For DO-DTT and DT traffic type, Rel-19 design principles are reused. For DO-A traffic type, the network provides a transport between the AIoT Device and AF for data transfer and does not need to understand AIoT service specific (e.g., sensor application) logic.
* Rel-20 RAN design is assumed to include DO-A specific procedures, which can support SA2s end-to-end DO-A procedures.