**3GPP TSG-SA WG1 Meeting #98e S1-221053r5**

**Electronic Meeting, 9 – 19 May 2022** *(revision of S1-22xxxx)*

Title: New use case: Ambient\_IoT in personal belongings finding

Agenda Item: 7.3

Source: vivo

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*Abstract: This document provides a Text Proposal for the use case about using Ambient\_IoT services for* *personal belongings finding.*

Proposal

It is proposed to add the following reference and use case description in TR 22.840.

\*\*\*\*\*\*\*\*\*\*\*\*\* Start of Changes \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non‑specific.

- For a specific reference, subsequent revisions do not apply.

- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

[x1] 3GPP TS 22.261: "Service requirements for the 5G system".

\*\*\*\*\*\*\*\*\*\*\*\*\* Next Change \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

5.x Use Ambient\_IoT service for personal belongings finding

5.x.1 Description

Sometimes in daily life, Mickey cannot remember where he put his wallet, or his favourite pair of shoes. He may become crazy if he is in a hurry to go out.

With Ambient power-enabled IoT (Ambient\_IoT) service provided by 5GS. Mickey can attach Ambient\_IoT Devices to his wallet and shoes. Then he can easily find them using his mobile phone which supports Ambient\_IoT service. The Ambient\_IoT Device is solely dependent on harvested ambient energy, being maintenance-free, of extremely-low complexity, weight, and size.

5.x.2 Pre-conditions

Mickey bought a mobile phone supporting Ambient\_IoT service. He also obtains multiple Ambient\_IoT Devices for personal belongings positioning.

5.x.3 Service Flows

1. Mickey’s and his roommate Minnie’s mobile phones may be authorized by their mobile operators to perform the Ambient\_IoT service.
2. Mickey attaches one AmbinetIoT Device to his wallet, registers “Mickey’s wallet” to the application server.
3. When Mickey wants to find his wallet, he opens the application in his mobile phone to search his wallet.
4. Mickey’s mobile phone performs the inventory operation (e.g. generates the RF power to activate the Ambinet\_IoT device attached to his wallet, sends downlink control signaling to it and read out unique IDs from it) and identify that the wallet is nearby. The Ambient\_IoT Device attached to his wallet may play a sound for Mickey to easily find it. Furthermore, Mickey’s mobile phone may display the position of the wallet (e.g. relative position of the mobile phone).
5. Mickey authorizes Minnie’s mobile phone to perform the inventory operation to his wallet Device.

NOTE: Mickey’s mobile phone, Minnie’s mobile phone and the AmbinetIoT Device to Mickey’s wallet can belong to one Personal IoT Networks as described in TS 22.261 [x1] clause 6.38.

1. The other day, Mickey goes out to the bank. When he arrives at the bank, he cannot find his wallet. He would like to check whether his wallet is left at home. Mickey opens the application in his mobile phone and see the position of his wallet is in his home with the help of Minnie’s mobile phone. In order to implement this, the application server requests Minnie’s mobile phone about the position of the Ambinet\_IoT device attached to Mickey’s wallet. Minnie’s mobile phone performs the inventory operation to the Ambinet\_IoT device and identify the relative position of it.
2. Mickey may also see the position of his wallet is at a coffee shop with the help of the base station near the coffee shop. In order to implement this, the application server requests from the 5G system about the position of the Ambinet\_IoT device attached to Mickey’s wallet. Upon receiving the request, the RAN performs the inventory operation to the Ambinet\_IoT device and identify the position of it.

5.x.4 Post-conditions

Thanks to the Ambient\_IoT service provided by the 5G system, Mickey can find his wallet as soon as possible, both indoor and outdoor.

5.x.5 Existing features partly or fully covering the use case functionality

None.

5.x.6 Potential New Requirements needed to support the use case

5.x.6.1 Service requirements for use of Ambient\_IoT services for personal belongings positioning

[PR.5.x.6.1-001] The 5G system shall support communication for Ambient\_IoT devices limited in their operation by the amount of power available, and might also be powered intermittently.

[PR.5.x.6.1-002] The 5G system shall support authorization of Ambient\_IoT devices to access the 3GPP network.

[PR.5.x.6.1-00x] Upon request from the Ambient\_IoT Application server the 5G system shall be able to generate RF power sufficient to activate an Ambient\_IoT device, in order to establish communication with the Ambient\_IoT device.

[PR.5.x.6.1-003] The 5G system shall to able to transfer data (which size is up to a few hundreds of bits) between an Ambient\_IoT device and the Ambient\_IoT Application server.

[PR 5.x.6.1-005] The 5G system shall be able to provide the indoor and outdoor positioning services to Ambient\_IoT devices.

Editor's note: It is FFS whether AmbientIoT Devices need to be identified in 5GC.

5.x.6.2 KPIs for the use of Ambient\_IoT services for personal belongings positioning

[PR.5.x.6.2-001] The 5G system shall be able to provide AmbientIoT service with following KPIs:

Table 5.x.6.2-1 AmbientIoT service KPI for personal belongings finding

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Scenario | Max. allowed end-to-end latency | Max. instantaneous device power consumption | Service bit rate: user-experienced data rate | communication range | positioning accuracy |
| Personal belongings finding  (indoor) | [1] s | [20 – 50] uW | [< 1 kbit/s] | [10] m | [1-3] m @ 90% |
| Personal belongings finding  (outdoor) | [1] s | [100] uW | [< 1 kbit/s] | [100] m | [5-10] m @ 90% |

NOTE: The “Max. instantaneous device power consumption” is for both receiving and transmitting.

\*\*\*\*\*\*\*\*\*\*\*\*\* End of Changes \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*