**3GPP TSG-WG SA2 Meeting #170 S2-250XXXX**

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**Source: vivo, ETRI**

**Title: New solution for KI#4: Sensing Data and the Associated Information Collection and Transport via data tunnel**

**Document for: Approval**

**Agenda Item: 20.2.1**

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

*Abstract of the contribution: This paper proposes a new solution for KI#4: Sensing Data and the Associated Information Collection and Transport of the FS\_Sensing\_ARC TR 23.700-14.*

# 1 Discussion

This paper proposes a new solution to address KI#4 Sensing Data and the Associated Information Collection and Transport.



**Figure 1: System Architecture to support Sensing Services in reference point representation**

As shown in this reference point architecture, a new control plane interface (e.g. Nx) between the AMF and the Sensing Function is added for the sensing signalling transport between the Sensing Entity (i.e. gNB) and the Sensing Function over control plane. Meanwhile, a new direct user plane interface (e.g. Ny) between the Sensing Entity (i.e. gNB) and the Sensing Function is added for the sensing data transport over user plane.

The solution is based on the following principles to support sensing data and associated information collection and transport:

1) The sensing signalling is transported based on control plane, while the sensing data (i.e. sensing measurements data) and associated information (e.g. Sensing Service ID) are transmitted from the Sensing Entity to the Sensing Function via a GTP-U based data tunnel over user plane.

2) The GTP-U based data tunnel establishment procedure is based on control plane signalling interaction.

3) The Sensing Function and Sensing Entity (i.e. gNB) exchange their tunnel information (e.g. TEID (Tunnel Endpoint ID) and/or IP address) for GTP-U based data tunnel establishment.

About GTP-U based data tunnel establishment between the gNB and the Sensing Function, GTP-U protocol is used. Unlike UE associated GTP-U tunnel established between the gNB and the UPF over N3 during the UE initiated PDU session establishment procedure, a non-UE associated GTP-U tunnel is established between the gNB and the Sensing Function under the control of Sensing Function over the new user plane interface (e.g. Ny). The detailed establishment procedure can mimic steps 10 to 16 of PDU Session Establishment procedure in subclause 4.3.2.2.1 of TS 23.502, i.e. exchange tunnel information of Sensing Function and gNB. As this is a new non-UE associated GTP-U tunnel over new interface, it has no impact on existing UE associated GTP-U tunnel over N3. There is no enhancement required for GTP-U protocol as well.

The AMF involved for Sensing control signalling delivery is a non-UE associated AMF, named intermediate AMF (I-AMF). Such I-AMF can be selected by the Sensing Function based on the local configuration or querying the NRF, e.g. as specified in Solution #13 for KI#3. The selected I-AMF can serve the selected gNBs as Sensing Entity. To use the I-AMF for Sensing control signaling delivery could avoid defining a new control plane interface/protocol for the gNB, i.e. NGAP over N2 interface can be re-used.

Based on the above principles, an end-to-end procedure for KI#4 is provided.

# 2 Proposal

It is proposed to include the following changes in TR 23.700-14 V0.2.0.

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

6 Solutions

6.0 Mapping of Solutions to Key Issues

**Table 6.0-1: Mapping of Solutions to Key Issues**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **Key Issues** | | | | | |
| **Solutions** | **#1** | **#2** | **#3** | **#4** | **#5** | **#6** |
| **#1** | X |  | X | X | X |  |
| **#2** |  | X |  |  | X |  |
| **#3** | X | X | X | X | X | X |
| **#4** | X |  |  |  |  |  |
| **#5** | X |  |  | X |  |  |
| **#6** | X | X | X |  |  |  |
| **#7** | X |  |  |  |  |  |
| **#8** |  | X |  |  |  |  |
| **#9** |  | X |  |  |  |  |
| **#10** |  | X |  |  |  |  |
| **#11** |  | X |  |  |  |  |
| **#12** |  | X |  |  |  |  |
| **#13** |  |  | X |  |  |  |
| **#14** |  |  | X |  |  |  |
| **#15** |  |  | X |  |  | X |
| **#16** |  |  | X |  |  |  |
| **#17** |  |  | X |  |  |  |
| **#18** |  |  |  | X |  |  |
| **#19** | X | X |  |  | X |  |
| **#20** |  |  |  |  |  | X |
| **X** |  |  |  | X |  |  |

**\* \* \* \* Next Changes (All text new) \* \* \* \***

## 6.X Solution #X: Sensing Data and the Associated Information Collection and Transport via data tunnel

### 6.X.0 High-level solution Principles

The solution is based on the following principles to support sensing data and associated information collection and transport via data tunnel:

1) The sensing signalling is transported based on control plane, while the sensing data (i.e. sensing measurements data) and associated information (e.g. Sensing Service ID) are transmitted from the Sensing Entity to the Sensing Function via GTP-U based data tunnel over user plane.

2) The GTP-U based data tunnel establishment procedure is based on control plane signalling interaction.

3) The Sensing Function and Sensing Entity (i.e. gNB) exchange their tunnel information (e.g. TEID (Tunnel Endpoint ID) and/or IP address) for GTP-U based data tunnel establishment.

### 6.X.1 Description

This solution is to address KI#4 Sensing Data and the Associated Information Collection and Transport.

### 6.X.2 Procedures



**Figure 6.x.2-1: Procedure for Sensing Data and the Associated Information Collection and Transport**

0. The Sensing Function (SF) selects the Sensing Entity (SE) (i.e. gNB) and an I-AMF as specified in Solution #13 for KI#3 to make sure the selected I-AMF can serve the selected gNBs as Sensing Entity. In order to establish a GTP-U based data tunnel for sensing data transport, the Sensing Function allocates its SF tunnel information used for GTP-U based data tunnel establishment. The SF tunnel information includes the tunnel end point information and/or the address of the Sensing Function (i.e., TEID and/or IP address).

1. The Sensing Function sends the Sensing service request together with the gNB ID to the I-AMF by invoking the service operation provided by the I-AMF, e.g. Namf\_Communication\_N1N2MessageTransfer. The Sensing service request includes the SF ID and the SF tunnel information.

2. The I-AMF sends the received Sensing service request to the Sensing Entity identified by the gNB ID via an N2 message.

3. After receiving the Sensing service request including the SF ID and the SF tunnel information, the Sensing Entity allocates its SE tunnel information used for GTP-U based data tunnel establishment. The SE tunnel information includes the tunnel end point information and/or the address of the Sensing Entity (i.e., TEID and/or IP address). The Sensing Entity sends a Sensing service response together with the SF ID to the I-AMF. The Sensing service response includes the SE tunnel information and an operation execution result indication. The operation execution result indication indicates whether the Sensing service request is accepted or not.

4. The I-AMF sends the received Sensing service response to the Sensing Function identified by the received SF ID.

5. After exchanging the tunnel information, a GTP-U based data tunnel is established between the Sensing Function and the Sensing Entity for sensing data and the associated information collection and transport.

6. The Sensing Entity performs sensing operations to obtain sensing measurements data.

7. After the sensing measurements data obtention, the Sensing Entity sends the sensing measurements data and the associated information to the Sensing Function via the established GTP-U based data tunnel. The associated information includes the Sensing service ID determined by the Sensing Function for binding the sensing measurements data and requested Sensing service.

8. The Sensing Function performs sensing result generation based on the sensing measurements data and associated information received in step 7.

### 6.X.3 Impacts on services, entities and interfaces

The solution has impacts on the following entities:

Sensing Function:

- Support to provide the SF tunnel information to Sensing Entity.

- Support to receive the SE tunnel information from the Sensing Entity.

- Support to receive sensing data and the associated information from the Sensing Entity via the GTP-U based data tunnel.

Sensing Entity (i.e. gNB):

- Support to receive the SF tunnel information from the Sensing Function.

- Support to provide the SE tunnel information to the Sensing Function.

- Support to establish the GTP-U based data tunnel with the Sensing Function using the tunnel information received from the Sensing Function.

- Support to transfer sensing data and the associated information to the Sensing Function via the GTP-U based data tunnel.

I-AMF:

- Support to deliver the tunnel information between the Sensing Function and the Sensing Entity (i.e. gNB).

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