**SA WG2 Meeting #139e S2-2003660**

**June 1th-12th, 2020 ; Elbonia (revision of S2-2003660)**

**Source: Nokia, Nokia Shanghai Bell**

**Title: KI#3, new solution: Providing selected radio information to an App requiring it**

**Document for: Agreement (P-CR)**

**Agenda Item: 8.3**

**Work Item / Release: FS\_enh\_EC / Rel-17**

*Abstract of the contribution:* **KI#3, new solution: Providing selected radio information to an App requiring it**

# 1 Discussion

Key Issue #3: Network Information Provisioning to Local Applications with low latency

# 2 Proposal

**It is proposed to update TR 23.748 as follows with following new solution**

*FIRST CHANGE (all text is NEW)*

## 6.x Solution #x: Providing selected radio information to an App requiring it

### 6.X.1 Description

This solution addresses Key Issue #3: Network Information Provisioning to Local Applications with low latency.

An APP (Local Application) running on a network edge EAS may need information that are determined/known in NG-RAN, e.g.:

- Information on current available Radio conditions for the UE e.g. UE Radio conditions, RSRP, Radio Throughput, RAN DL (PDCP) buffer in overflow status,

- PLMN information, which contains data about the underlying mobile network that the APP is actually using to exchange traffic with the UE

- UE location information

- Etc...

APP(s) running on the network edge EAS need such data and/or Events in (near) Real Time. The solution does not consider the App configuring a NG RAN, just the App retrieving information about an UE served by a NG RAN.

For this release, per the constraint expressed in the FS\_enh\_EC Study Item (SP-200093), RAN information about the UE is limited to information that the RAN can currently report and defined in Tracing specifications related to RAN

The solution allows controlled exposure of (RAN) information about a UE towards APP (applications) hosted at edge computing

This solution is based on following principles:

- it is not expected that raw information handled by the NG RAN is directly provided to the APP as the network may want to protect / hide sensitive information: **an intermediate entity is needed to run policies on RAN related information being exposed to the APP**;

- the APP may only know how to address the UE over the DN (addressing information the APP uses to reach a UE e.g. the UE IP address + N6 tunnelling information) and is not expected to know the SUPI of the UE,

- the APP does not know and is generally not willing to know which NG RAN entities currently serve the UE; furthermore, it generally does not want to be bothered with Hand-Over information,

- the solution strives to **reuse as much as possible existing 3GPP mechanisms**:

- 3GPP R16 specifications allow an AF (Application Function) managing the EAS (Edge Application Server deployed locally to support Edge Computing) to subscribe to notifications of UE “UP path change” where it can get the mapping between addressing information to reach a UE and the 5GC identifier of this UE e.g. SUPI,

- 3GPP defines already a way for Tracing Requirements configured in the UE subscriptions data (in UDM/UDR) to be communicated to the NG RAN currently serving the UE,

- **3GPP Release 16 has defined streaming trace** and MDT capabilities (TS 32.422), allowing the NG RAN to **provide in Near Real time information** about a UE.

- 3GPP specifications about RAN tracing are reused

- The actual APIs that allow the APP to request NG RAN information from the EC AF (AF dedicated to Edge Computing) is considered not to be under scope of 3GPP SA2.

At high level the solution works as follows:

1. The APP requests (RAN) information about a UE, providing what it knows about the UE i.e. addressing information to reach a UE (e.g. the UE IP address + N6 tunnelling information) as well as the APP URI where it expects to receive such information. This request is forwarded to the (Edge Computing) AF that terminates the Nnef\_TrafficInfluence\_Notify API (API as defined for R16 in TS 23.502 clause 5.2.6.7); the (Edge Computing) AF can thus map addressing information to reach a UE into the SUPI or the GPSI,
* the (Edge Computing) AF is thus assumed to be operated by the PLMN while the App and the EAS (data center) may be operated by a third party
1. The APP request is then transformed into a dedicated Tracing Requirement about a SUPI to get the related RAN information for this particular UE. Such Tracing Requirements are configured in the UDM/UDR and passed by the 5GC to the NG RAN serving the UE (per existing signalling trace configuration defined in R16 23.501 clause 5.25.1),
2. These Trace Requirements do not request the NG RAN to directly provide the information to the APP but configure the NG RAN to report the information to an edge Trace Collection Entity together with information on the Final destination of the information (identity of the APP, APP URI where the APP expects the information etc…)
3. The local NEF / edge Trace Collection Entity enforces policies related with the identity of the APP and then provides the filtered information on the APP URI. These policies allow the network operator to protect / hide sensitive information.

This is further defined in clause 6.X.2.

The solution introduces a new entity: the local NEF which:

* receives RAN REPORT corresponding to tracing requests handled by NG RAN. For this purpose, it acts as a consumer of NOTIFICATION (SBA) defined by SA5 MnS framework

NOTE: the mechanism described in this solution is not expected to load “central OAM entities” as the recipient of the RAN REPORT is the local NEF and not “central OAM entities”. The interface between NG RAN and the local NEF is Service Based but defined by SA5.

* applies operator policies related with data that the operator is willing to share with the EAS / Edge App. The local NEF is configured by the EC AF with the way (URI, etc…) to report RAN information to the EAS / Edge App.

The local NEF is an entity specified by SA2 but that uses SBA interfaces defined by SA5 specifications to receive tracing information from NG RAN

Editor’s Note: a precise list of the NG RAN OAM specifications expected to be supported by the local NEF needs to be provided.

The EC AF is an entity specified by SA2 but that uses SBA interfaces defined by SA5 specifications to request user tracing information from NG RAN

Editor’s Note: a precise list of the NG RAN OAM specifications expected to be supported by the EC AF needs to be provided.

Editor’s Note: It is FFS whether and if yes how SA5 allows NF not belongs to management system to trigger tracing.

Editor’s Note:: it is FFS how to ensure that the solution does not interfere with tracing for VIP users or for checking  fault in the network.

The EC AF and the local NEF are owned by the operator.

### 6.X.2 Procedures



Figure 6.X.2-1: Using streaming trace to deliver filtered RAN information to a local App

1 (pre-requisite) the UE has established a PDU session (where traffic offload may apply) and the EC (Edge Computing) AF has subscribed to the SMF event “UP path change” as defined in 23.502 § 5.2.8.3.1.

2 In the notification corresponding to the SMF event “UP path change” the SMF provides (as defined in 23.502 § 5.2.8.3.1 and § 5.2.8.3.2) the EC (Edge Computing) AF with:

- Event ID, Notification Correlation Information, UE ID (SUPI and if available GPSI), PDU Session ID, time stamp

- As it is for “UP path change”, the notifications contain also

- The Target DNAI (corresponds to the Edge Environment that hosts edge Application)

- addressing information to reach a UE:

- UE IP address / Prefix.

- N6 traffic routing information.

NOTE1: It is assumed that the EC AF is managed by the operator so that it can receive the SUPI

3 The UE invokes an APP running on the EAS,

4 The APP sends a request for information about the UE. The APP provides:

 - The Requested RAN Info Type (= e.g. request for throughput, UE location, etc.). The request may correspond to a one-shot information GET or to a SUBSCRIBE request to receive notifications. The Requested RAN Info is constrained by information that can be retrieved via 3GPP R16 RAN related tracing.

- The target UE identified by addressing information to reach the UE on the local N6 (which maps to the UE IP address / Prefix + N6 traffic routing information of the notification in step 2).

- a URI (Notification Target Address) where the APP wishes to receive the corresponding notifications and possibly an NCI (Notification Correlation Id) to help the APP to retrieve the proper APP context corresponding to the notifications it will receive due to this request.

NOTE2: the way for the UE to invoke the APP and for the APP sends requests for information to the EC AF about a UE is out of scope of SA2

The EAS forwards the request to the EC AF (which is acting as manager of the edge Computing deployments): the EC AF receives at least:

- The Requested 5G RAN Info Type,

- addressing information to reach the UE on the local N6,

- Data delivery information that contains at least the Notification Target Address / URI where the collected NG RAN related information is to be delivered but may also contain a Correlation identifier (NCI),

- the DNAI (to indicate the instance of Edge Environment) and,

- the APP or EAS identity.

5 The EC AF configures tracing usage as follows:

5a The EC AF selects and configures an local NEF to receive Tracing Report from the NG RAN and to forward the content to the APP on the EAS (using Data delivery information)

5b The EC AF configures tracing in 5GS. This induces then steps 6 and 7;

The EC AF acting as a central Trace collection Entity creates a Trace/MDT request (Tracing requirements) that contains (Requested RAN Info Type, local NEF URI, trace reference,) and targeting a SUPI; the local NEF is the entity responsible to apply operator policies to raw information sent by the NG RAN. The local NEF can be selected based on a local configuration that provides the association between DNAI(s) and the corresponding local NEF. In this solution the EC AF is assumed to be owned by the operator (it receives the SUPI and requests tracing) and to have access to (e;g. be configured with) a mapping from DNAI to local NEF

Editor’s Note: a precise list of the NG RAN OAM specifications expected to be supported by the EC AF to configure tracing needs to be provided.

In step 5a, the EC AF configures the local NEF with the mapping between a Trace Reference and

* Data delivery information needed by the local NEF to deliver the requested information via an API to the proper APP
* the APP or EAS identity needed by the local NEF to determine the operator policies related with data that the operator is willing to share with the EAS / Edge App

The APP identity is the identity as validated by the 5GC: if the EAS is managed by the operator, it is the final APP identity as validated by the EAS; Otherwise it is the EAS identity as validated by the EC AF

NOTE: The mechanisms to validate the identity of the APP / of the EAS are defined by SA3;

In step 5b, The EC AF asks 5GC for trace (Requested RAN Info Type, Trace Reference) about the UE identified by its SUPI/GPSI.

The EC AF knows per notifications received in step 2 how to map UE IP address information to the SUPI and can thus translate the request received in step 4 into a request targeting a UE.

Tracing Requirements are configured in the UDM/UDR as part of subscription data of the SUPI.

6 Tracing Requirements are transferred to NG RAN via existing (R16) mechanisms

6a) The Tracing Requirements are transferred to AMF as part of subscription data per R16 specs (as part of subscription data defined in Table 5.2.3.3.1-1 of R16 TS 23.502) and then 6b) transferred from AMF towards the NG RAN over NGAP as defined in R16 38.413

7 The NG RAN starts sending the notifications (RAN REPORT) to the local NEF providing the Requested RAN Info

8 The local NEF makes any necessary control or parameter translation within Requested RAN Info based on local policies related with the APP identity

9. The local NEF sends the updated / filtered Requested RAN Info to the target (determined using Data delivery information) i.e. to the App on the EAS.

### 6.X.3 Impacts on Existing Nodes and Functionality

The proposed solution is based on Rel-16 procedures (delivery of tracing requirements to the NG RAN, EC AF receiving 5GS notification using Nnef\_TrafficInfluence service, but following enhancements are needed:

* the reporting mechanism does not require RAN change
* Addition of the local NEF in the architecture, where the local NEF is to apply operator policies to NG RAN notifications sent to the EAS / App

Upgrade of the role of the EC related AF: this AF is to transform an App/EAS request into a tracing requirement written in UDR and to configure the local NEF accordingly

*Next CHANGES*

## 6.0 Mapping of Solutions to Key Issues

Table 6.0-1: Mapping of Solutions to Key Issues

|  |  |
| --- | --- |
| Solutions | Key Issues |
| 1 | 2 | 3 | 5 |
| #1: Provisioning URSP configuration to the UE to establish PDU Sessions for edge applications | X |  |  |  |
| #2: Local DNS based edge server address discovery | X |  |  |  |
| #3: DNS AF | X |  |  |  |
| #4: Providing the DNS authoritative server with IP addressing information about where the UE is located | X |  |  |  |
| #5: Server Discovery using DNS, IP Routing and URSP | X |  |  |  |
| #6: Discovery of EAS based on DNS | X |  |  |  |
| #7: SMF/I-SMF selection based on DNAI | X |  |  |  |
| #X: Providing selected radio information to an App requiring it |  |  | X |  |

*End of CHANGES*