**3GPP TSG-WG SA2 Meeting #146E e-meeting *S2-210xxxx***

**Elbonia, August 16 – 27, 2021 (revision of S2-210xxxx)**

**Source: Huawei, HiSilicon**

**Title: Alignment of reference point names**

**Document for: Approval**

**Agenda Item: 8.8**

**Work Item / Release: 5G\_ProSe / Rel-17**

*Abstract: Many reference points have been added for ProSe and the names/numbering of those reference points are updated so to match 23.501.*

# 1. Introduction/Discussion

TS 23.304 version 1.0.0 was produced before SA#92e which approved updates to TS 23.501 that included allocation of the final reference points names/numbers to the N interfaces in the ProSe architecture. The figures and mentions of the reference point names/numbers are updated such that they are aligned i.e. references to Nxx, Nzz, Npd, PC2a are changed to the relevant reference point.

As part of the changes, editorial updates to figures (e.g. remove misplaced diagrams and add back in missing diagrams) are also included.

# 2. Text Proposal

It is proposed to capture the following changes vs. TS 23.304.

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

## 4.2 Architectural reference model

### 4.2.1 Non-roaming reference architecture

Figure 4.2.1-1 shows the high-level view of the non-roaming 5G System architecture for Proximity-based Services (ProSe). In this figure, UE A and UE B use a subscription of the same PLMN.



Figure 4.2.1-1: Non-roaming 5G System architecture for Proximity-based Services

Figure 4.2.1-2 shows the high-level view of the non-roaming 5G System architecture for Proximity-based Services (ProSe) in reference point representation. In this figure, UE A and UE B use a subscription of the same PLMN.

N8

UE A

UE B

ProSe

Application

ProSe

Application

NG-RAN

UDM

PCF

AMF

SMF

5G

DDNMF

ProSe

Application

Server

NEF

**5GC**

PC1

PC1

N11

N15

N8

N68

N69

N2

Uu

N67

N33

PC5

PC3a

PC3a

Uu

N7

N64



Figure 4.2.1-2: Non-roaming 5G System architecture for Proximity-based Services in reference point representation

### 4.2.2 Roaming reference architecture

Figure 4.2.2-1 show the high-level view of the roaming 5G System architecture for Proximity-based Services (ProSe). In the figure, UE A uses a subscription of HPLMN.

UE A

UE B

NG-RAN

Uu

Uu

AMF

PCF

NRF

SMF

UPF

PC5

ProSe

Application

Server

ProSe

Application

ProSe

Application

PC1

N67

PC3a

UDM

PCF

NEF

5G

DDNMF

**5GC**

**5GC**

**HPLMN**

**VPLMN**

5G

DDNMF

UPF

SMF

Data

Network

Figure 4.2.2-1: roaming 5G System architecture for Proximity-based Services

### 4.2.3 Inter-PLMN reference architecture

The following figure 4.2.3-1 show the high level view of the non-roaming inter-PLMN architecture. In this figure, PLMN A is the HPLMN of UE A and PLMN B is the HPLMN of UE B.



Figure 4.2.3-1: non-roaming Inter-PLMN 5G System architecture for Proximity-based Services

Figure 4.2.3-2 shows the high level view of the roaming architecture. In this figure, UE A uses a subscription of PLMN A and UE B uses a subscription of PLMN B; UE A is roaming in PLMN C while UE B is not roaming.



Figure 4.2.3-2: roaming Inter-PLMN 5G System architecture for Proximity-based Services

### 4.2.4 AF-based service parameter provisioning

The 5G System provides NEF services to enable communication between NFs in the PLMN and a ProSe Application Server. Figure 4.2.4-1 shows the high level view of AF-based service parameter provisioning for 5G ProSe communications. The ProSe Application Server may provide ProSe service parameters to the PLMN via NEF. The NEF stores the ProSe service parameters in the UDR.



Figure 4.2.4-1: 5G System architecture for AF-based service parameter provisioning for 5G ProSe communications

### 4.2.5 Reference points

**PC1**: The reference point between the ProSe application in the UE and in the ProSe Application Server. It is used to define application level signalling requirements. This reference point is not specified in this release of the specification.

**PC3a**: The reference point between the UE and the 5G DDNMF. PC3a relies on 5GC user plane for transport (i.e. an "over IP" reference point). It is used to authorise 5G ProSe Direct Discovery request, and perform allocation of ProSe Application Codes / ProSe Restricted Codes corresponding to ProSe Application Identities used for 5G ProSe Direct Discovery.

**PC5**: The reference point between ProSe-enabled UEs used for control and user plane for 5G ProSe Direct Discovery, ProSe Direct Communication and ProSe UE-to-Network Relay.

**N64**: The reference point between the UDM and 5G DDNMF. It is used to provide subscription information in order to authorise 5G ProSe Direct Discovery request.

**N65**: The reference point between the 5G DDNMF in the HPLMN and the 5G DDNMF in a Local PLMN (5G ProSe Direct Discovery). This reference point is used for HPLMN control of ProSe service authorization.

**N66**: The reference point between the 5G DDNMF in the HPLMN and the 5G DDNMF in the VPLMN. It is used for HPLMN control of ProSe service authorization.

**N67**: The reference point between the ProSe Application Server and the 5G DDNMF. It is used to define the interaction between ProSe Application Server and 5G DDNMF for 5G ProSe Direct Discovery.

**N68:** The reference point between the PCF and the 5G DDNMF. It is used to define the interactions between the 5G DDNMF and the PCF to e.g. get a PDUID from the PCF.

**N69:** The reference point between the 5G DDNMF and the NEF.

NOTE: N64, N65, N66, N67, N68 and N69 show the interactions that exist between the NF services in the NFs. These reference points are realised by corresponding NF service-based interfaces and by specifying the identified consumer and producer NF service as well as their interaction in order to realize a particular system procedure.

### 4.2.6 Service-based interfaces

**N5g-ddnmf:** Services provided by 5G DDNMF to manage inter-PLMN 5G ProSe Direct Discovery operations.

In addition to the relevant services defined in TS 23.501 [4] for the following service-based interfaces, in the case of ProSe Service, the services can be provided by corresponding NF are as follows:

**Nudm**: Services provided by UDM are used to get 5G ProSe Service related subscription information to the AMF during Initial Registration procedure or UE Configuration Update (UCU) procedure to inform the AMF the subscription information has changed, and to provide ProSe Service related subscription information to 5G DDNMF for the authorisation of 5G ProSe Direct Discovery requests. The subscription information is described in TS 23.502 [5].

**Npcf**: Services provided by H-PCF are used to provide 5G ProSe Service related parameters to V-PCF for the UE and NG-RAN in the roaming case, and to enable the 5G DDNMF to get a PDUID or be notified of PDUID change.

**Nudr**: Services provided by UDR are used to notify the PCF and the UDM of the update of the 5G ProSe Service related information as described in TS 23.502 [5].

**Nnef**: Services provided by NEF are used by the ProSe Application Server to update 5G ProSe Service related information of 5GC.

**Namf:** Services provided by AMF are consumed by PCF to provide the 5G ProSe Service related parameters for the UE and the NG-RAN to the AMF, and to enable the AMF create or update the UE context related to 5G ProSe service.

**Nnrf:** Services provided by NRF are used to discover the PCF that supports 5G ProSe service and for 5G DDNMF in HPLMN to discover other 5G DDNMFs in VPLMN or local PLMN.

\* \* \* \* Next change \* \* \* \*

#### 4.3.2.1 General

The 5G DDNMF is the logical function handling network related actions required for dynamic 5G ProSe Direct Discovery. In this version of the specification, it is assumed that there is only one logical 5G DDNMF in each PLMN that supports 5G ProSe Direct Discovery service.

NOTE: If multiple 5G DDNMFs are deployed within the same PLMN (e.g., for load reasons), the method to locate the 5G DDNMF that has allocated a specific ProSe Application Code or ProSe Restricted Code (e.g. through a database lookup, etc.) is not defined in this version of the specification.

The 5G DDNMF interacts with the ProSe-enabled UE using procedures over PC3a reference point defined in clause 6.3.1 to allocate and resolve the mapping of ProSe Applications IDs and ProSe Application Codes used in 5G ProSe Direct Discovery. It uses ProSe related subscriber data stored in UDM for the authorisation of each discovery request. It also provides the UE with the necessary security material in order to protect discovery messages transmitted over the air. In restricted 5G ProSe Direct Discovery, it also interacts with the Application Server via N67 reference points or with other 5G DDNMFs via N65/N66 reference points for the authorization of the discovery requests.

The ProSe-enabled UE use procedure defined in clause 4.3.2.2 to discovery the 5G DDNMF in the HPLMN. Based on the UE Local Configuration or URSP as defined in TS 23.503 [9], an existing PDU session is selected or a new PDU session is established, to carry the control signalling between the UE and the 5G DDNMF in the HPLMN.

The 5G DDNMF provides the necessary charging functionality or charging information for the usage of 5G ProSe Direct Discovery and/or ProSe Direct Communication to interact with CHF or for the provision to CEF.

The 5G DDNMF in the HPLMN may interact with the 5G DDNMF in a VPLMN or Local PLMN in order to manage the 5G ProSe Direct Discovery service.

The 5G DDNMF gets the PDUID from the PCF and subscribes to notifications on Change of PDUID.

\* \* \* \* Next change \* \* \* \*

#### 6.1.1.6 5G DDNMF – ProSe Application Server

The 5G System architecture supports the service based N67 interface between 5G DDNMF and ProSe Application Server and optionally supports PC2 interface between 5G DDNMF and ProSe Application Server, to enable Proximity Services. See TS 23.501 [4] and TS 23.303 [3].

NOTE: PC2 support between 5G DDNMF and ProSe Application Server is for backwards compatibility for early deployments using Diameter.

\* \* \* \* End of changes \* \* \* \*